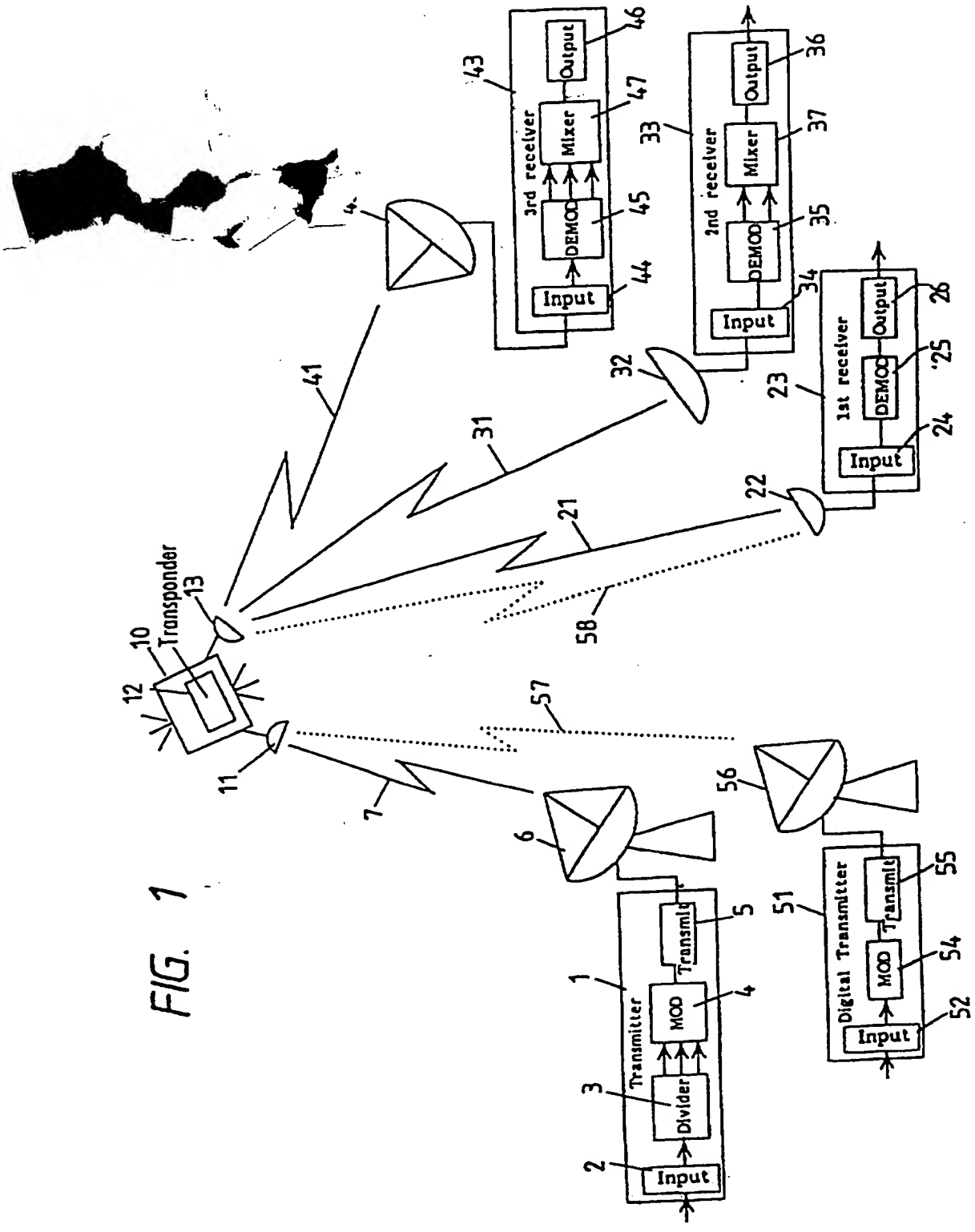

Transponder
13
10
12
11
41
31
21
58
57
7
6
4
43
46
Output
47
Mixer
45
DEMOD
44
Input
3rd receiver
33
36
Output
37
Mixer
35
DEMOD
34
Input
2nd receiver
32
22
23
26
Output
25
DEMOD
24
Input
1st receiver
56
51
55
Transmit
54
MOD
52
Input
Digital Transmitter
1
5
Transmit
4
MOD
3
Divider
2
Input
Transmitter

FIG. 1

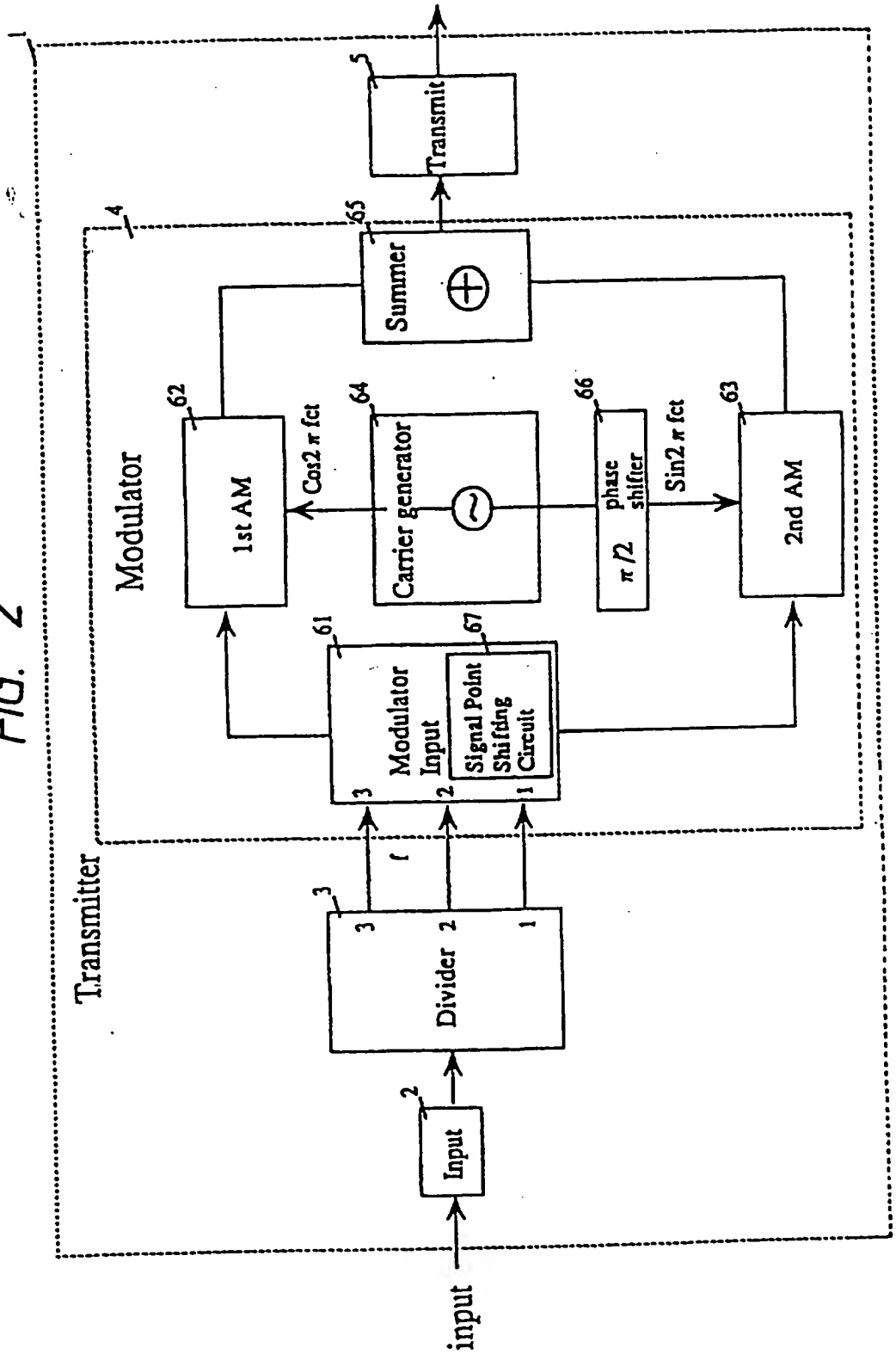

input
Transmitter
Input
2
Divider
3
2
1
f
3
2
1
Modulator Input
Signal Point Shifting Circuit
61
67
Modulator
1st AM
62
Cos2πfct
Carrier generator
64
phase shifter
π/2
66
Sin2πfct
2nd AM
63
Summer
65
Transmit
5
4

FIG. 2

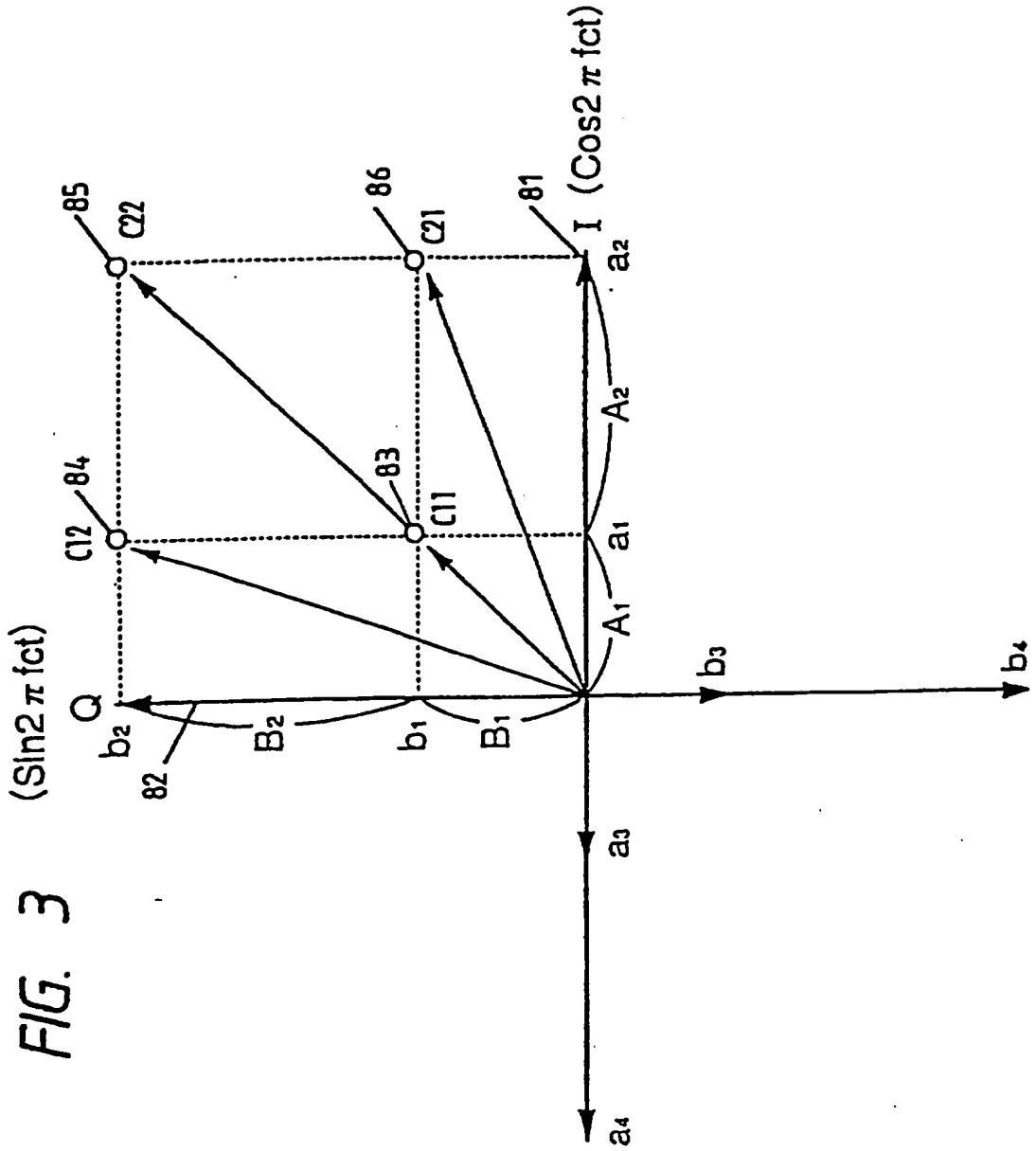

(Sin2πfct)
Q
(Cos2πfct)
I
C12
C11
C22
C21
81
82
83
84
85
86
a1
a2
a3
a4
b1
b2
b3
b4
A1
A2
B1
B2

FIG. 3

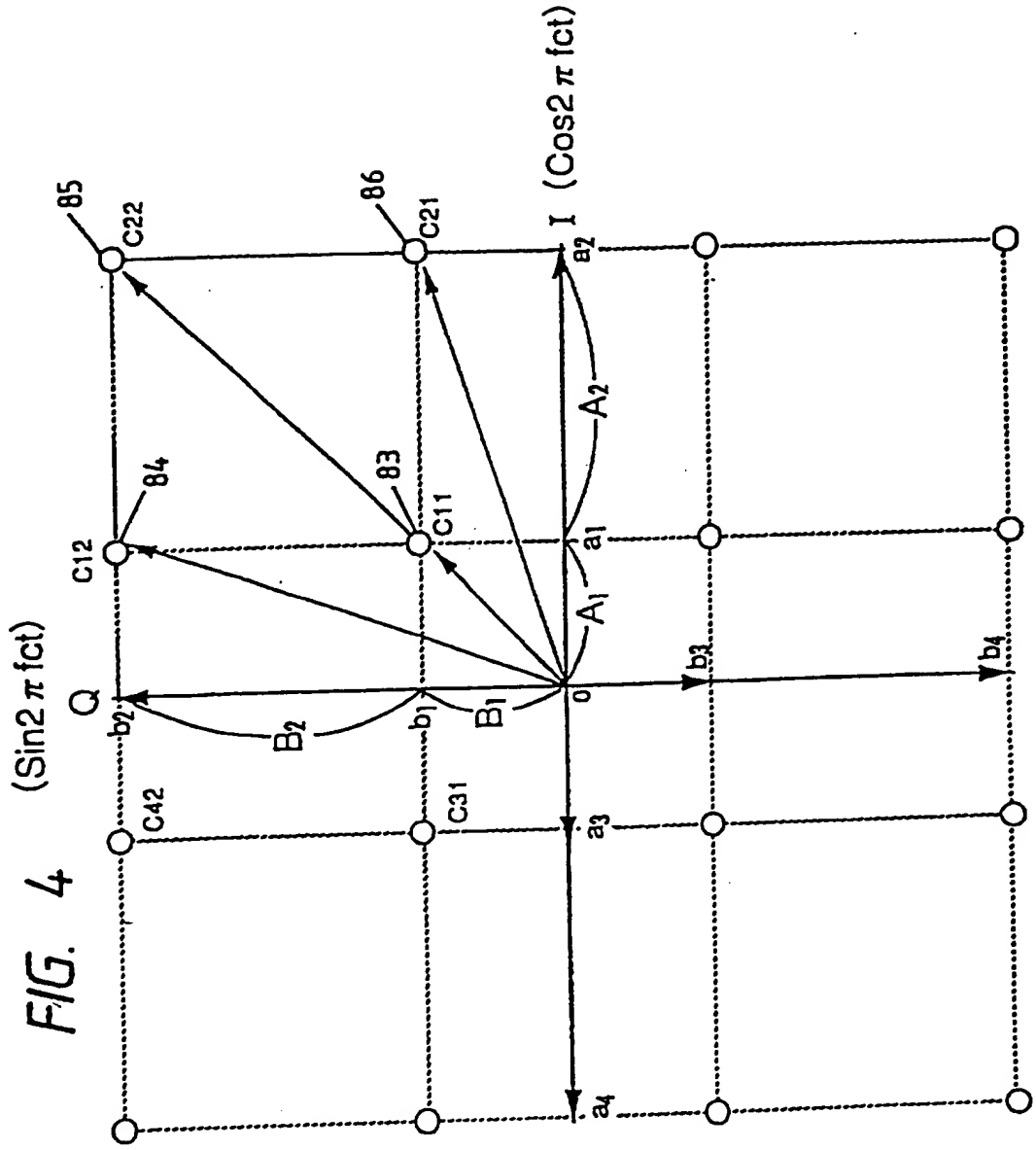

I (Cos2 π fct)
Q (Sin2 π fct)
85
86
84
83
C22
C21
C12
C11
C42
C31
a2
a1
a3
a4
b2
b1
b3
b4
A2
A1
B2
B1
0

FIG. 4

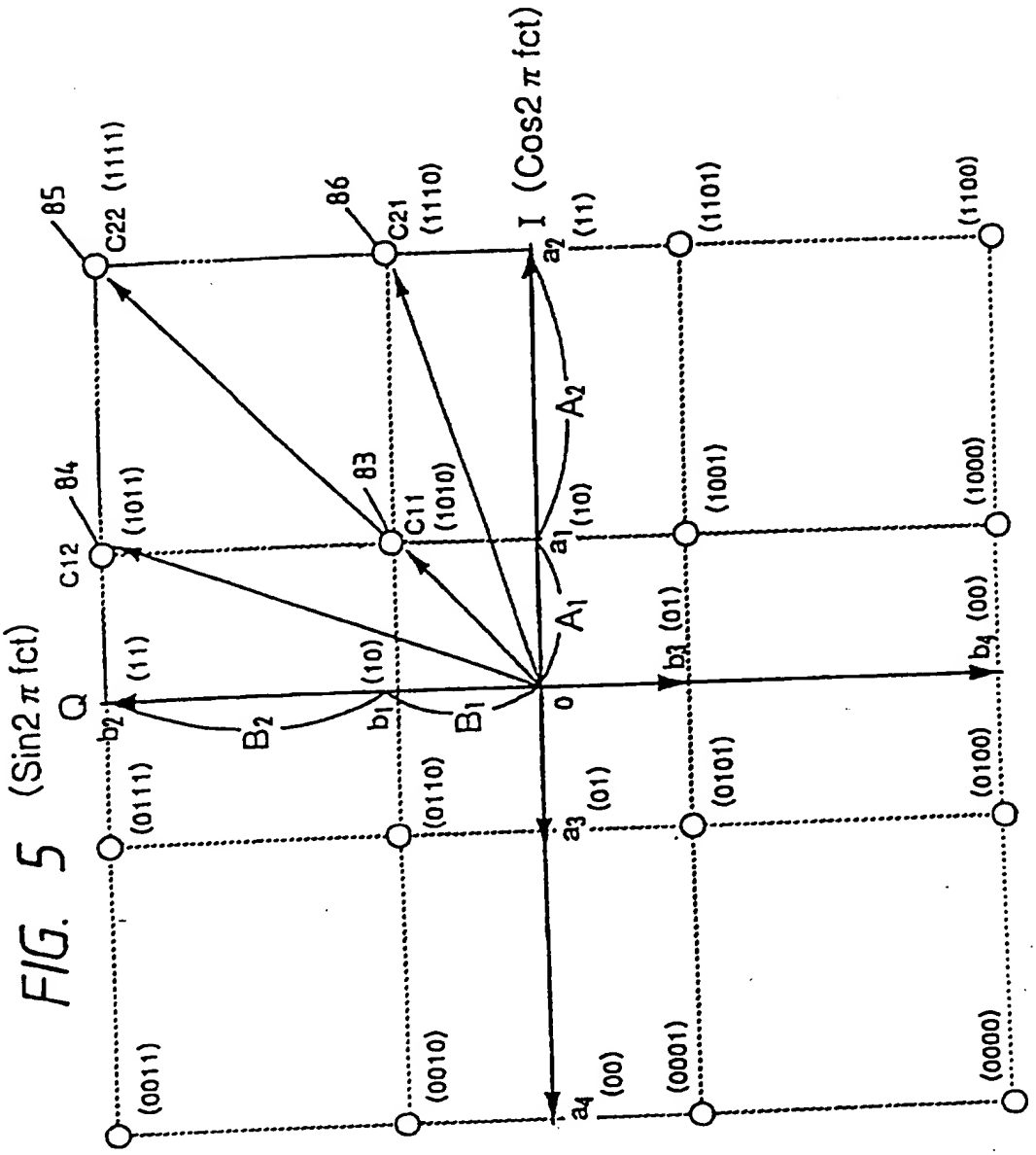

I (Cos2 π fct)
Q (Sin2 π fct)
85
86
84
83
C22 (1111)
C21 (1110)
C12
C11 (1010)
(1011)
(11)
(10)
(01)
(00)
(1101)
(1100)
(1001)
(1000)
(0111)
(0110)
(0101)
(0100)
(0011)
(0010)
(0001)
(0000)
a2
a1
a3
a4
A2
A1
B2
B1
b2
b1
b3
b4
o

FIG. 5

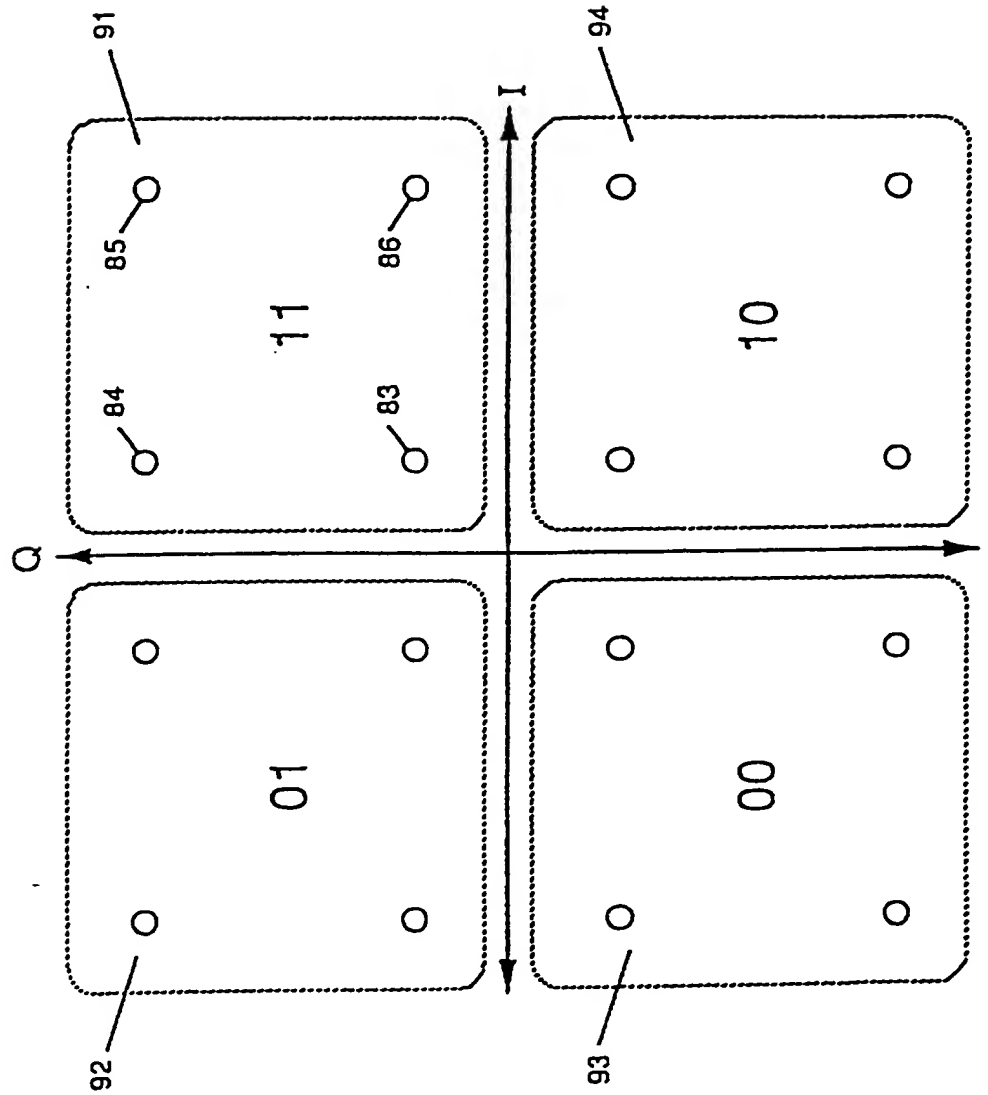


FIG. 6

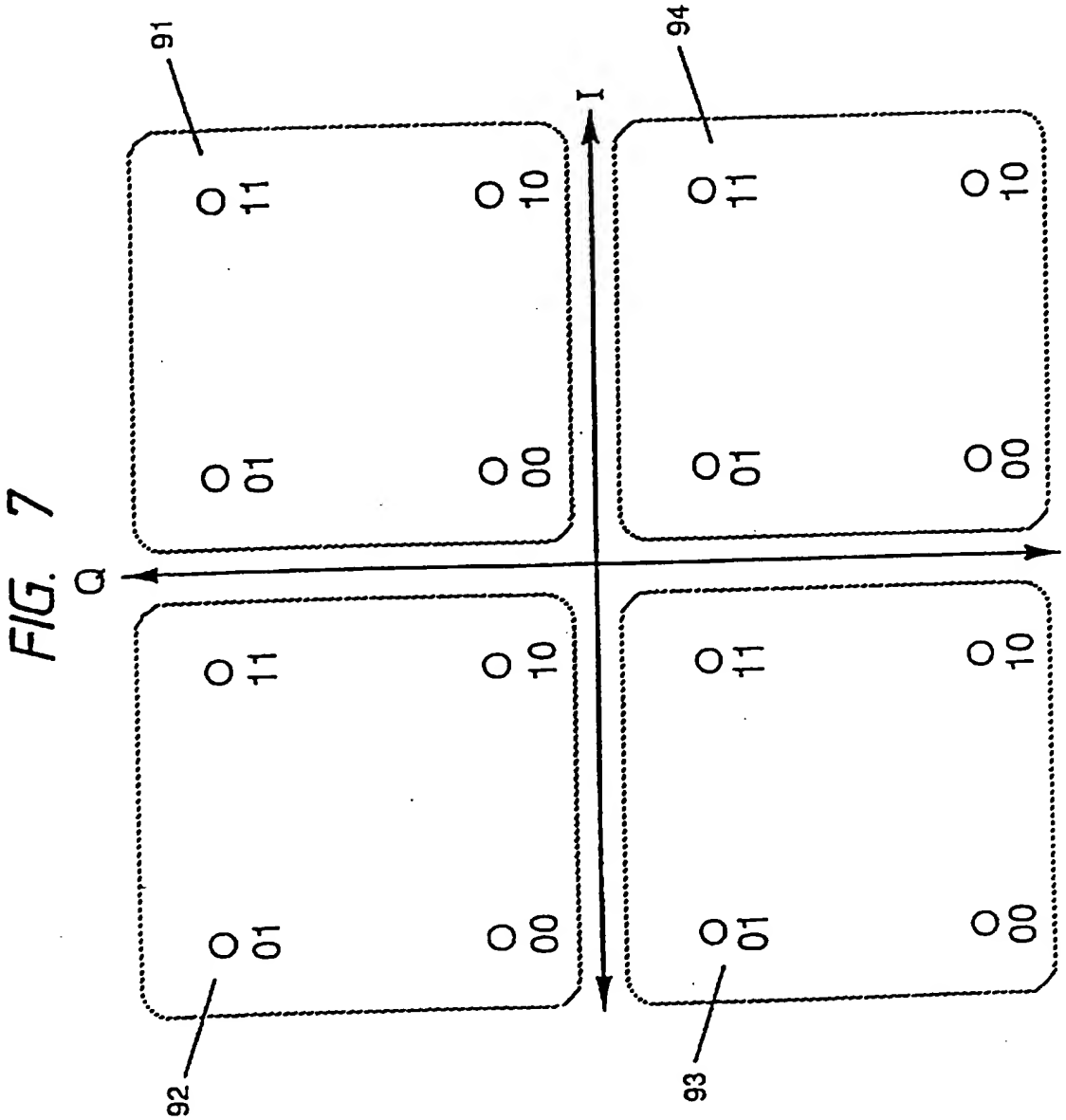


FIG. 7

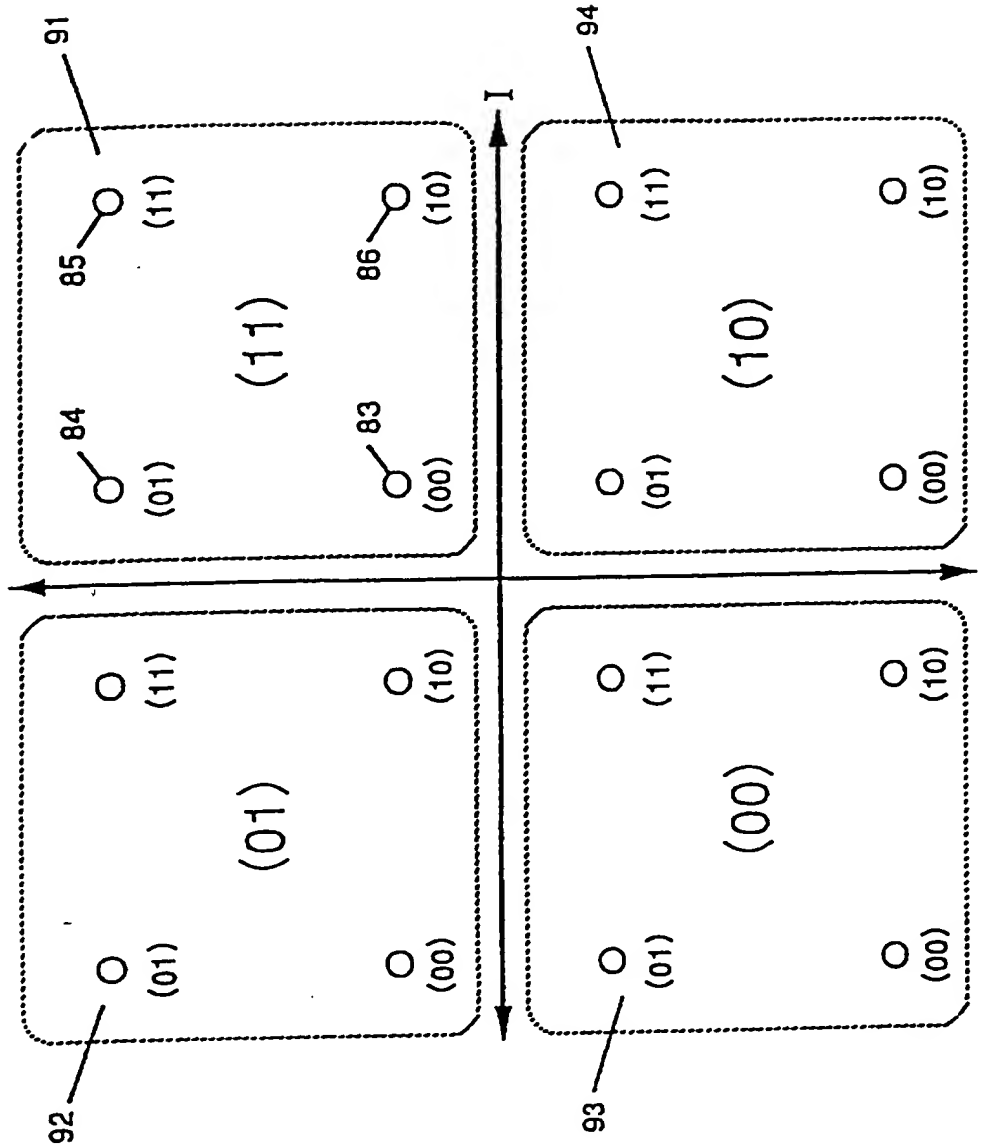


FIG. 8

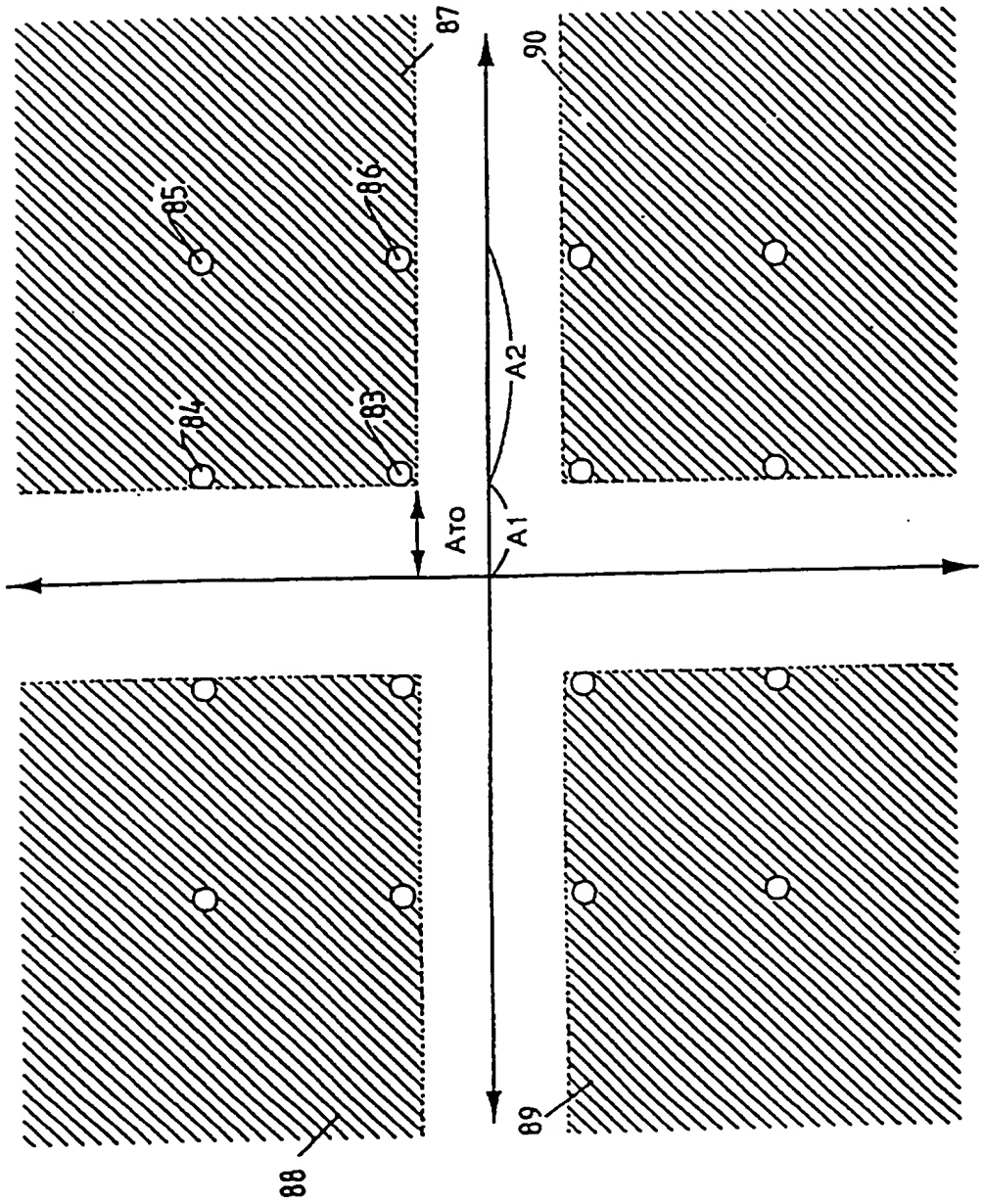
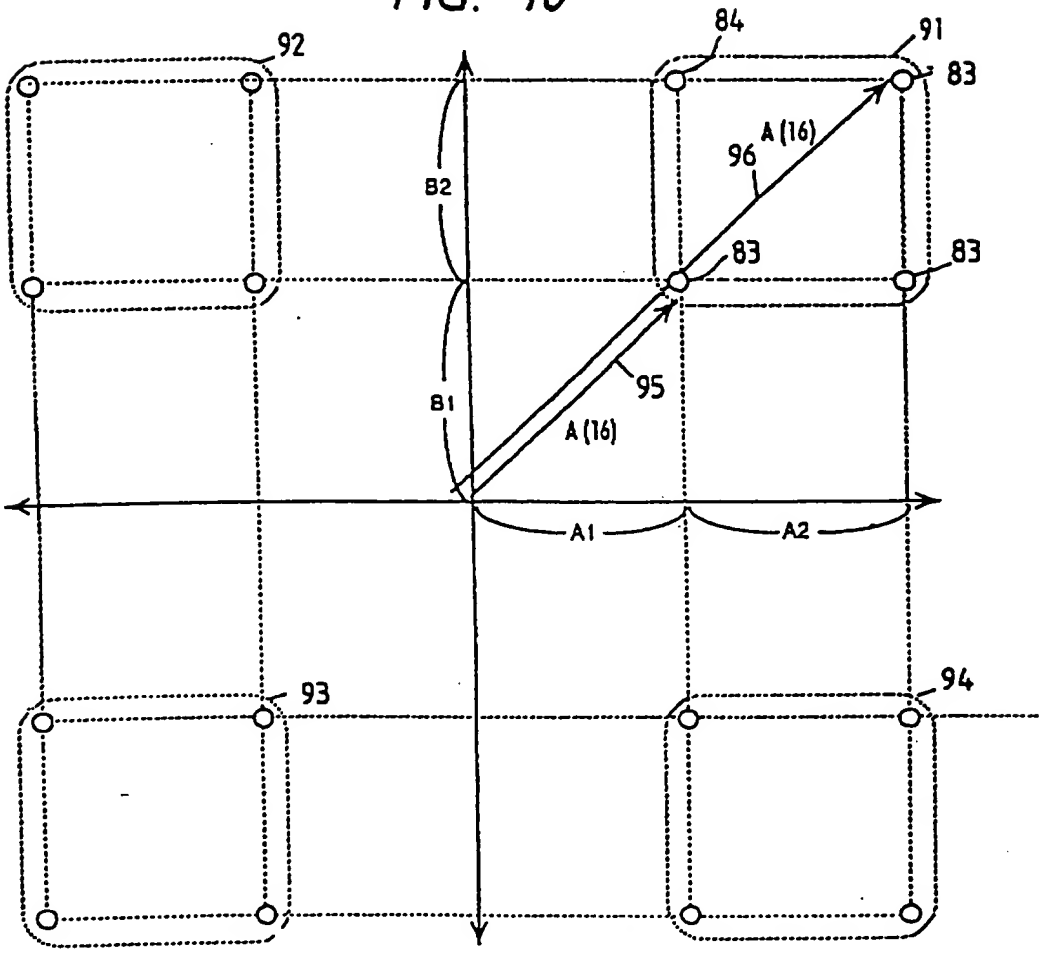


FIG. 9

FIG. 10



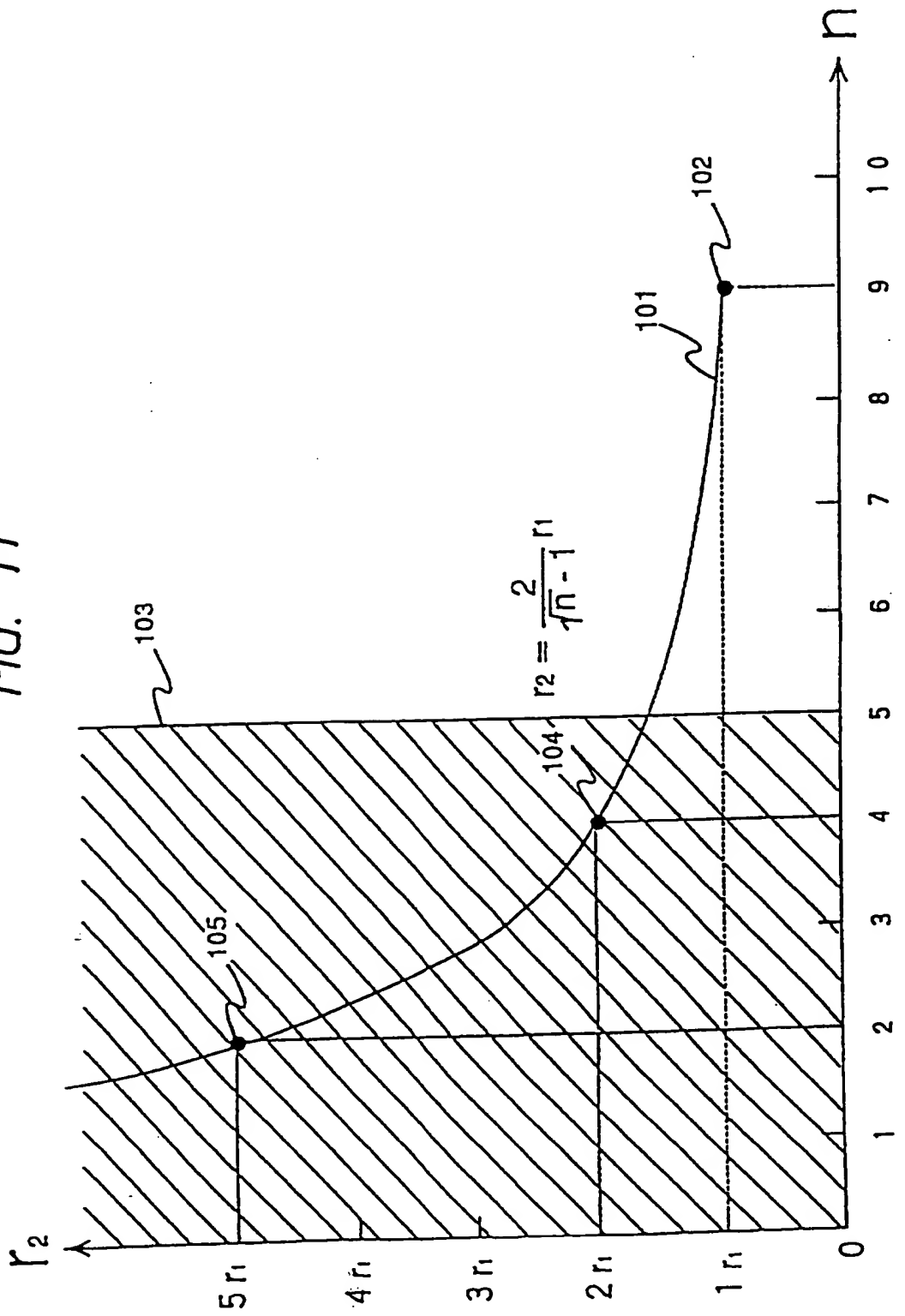
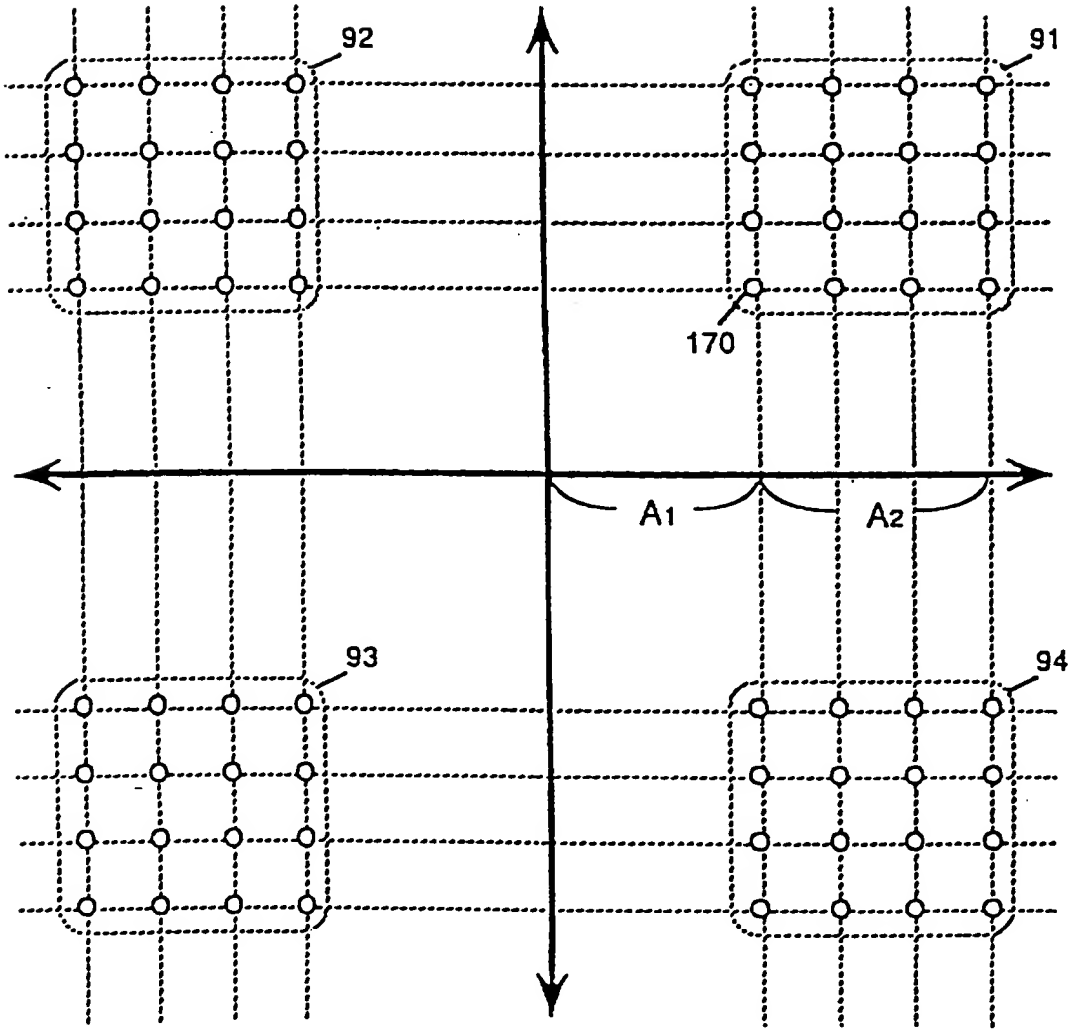

n
r2
r1
$r_2 = \frac{2}{\sqrt{n}-1} r_1$
101
102
103
104
105
0
1
2
3
4
5
6
7
8
9
10
1 r1
2 r1
3 r1
4 r1
5 r1

FIG. 11

FIG. 12



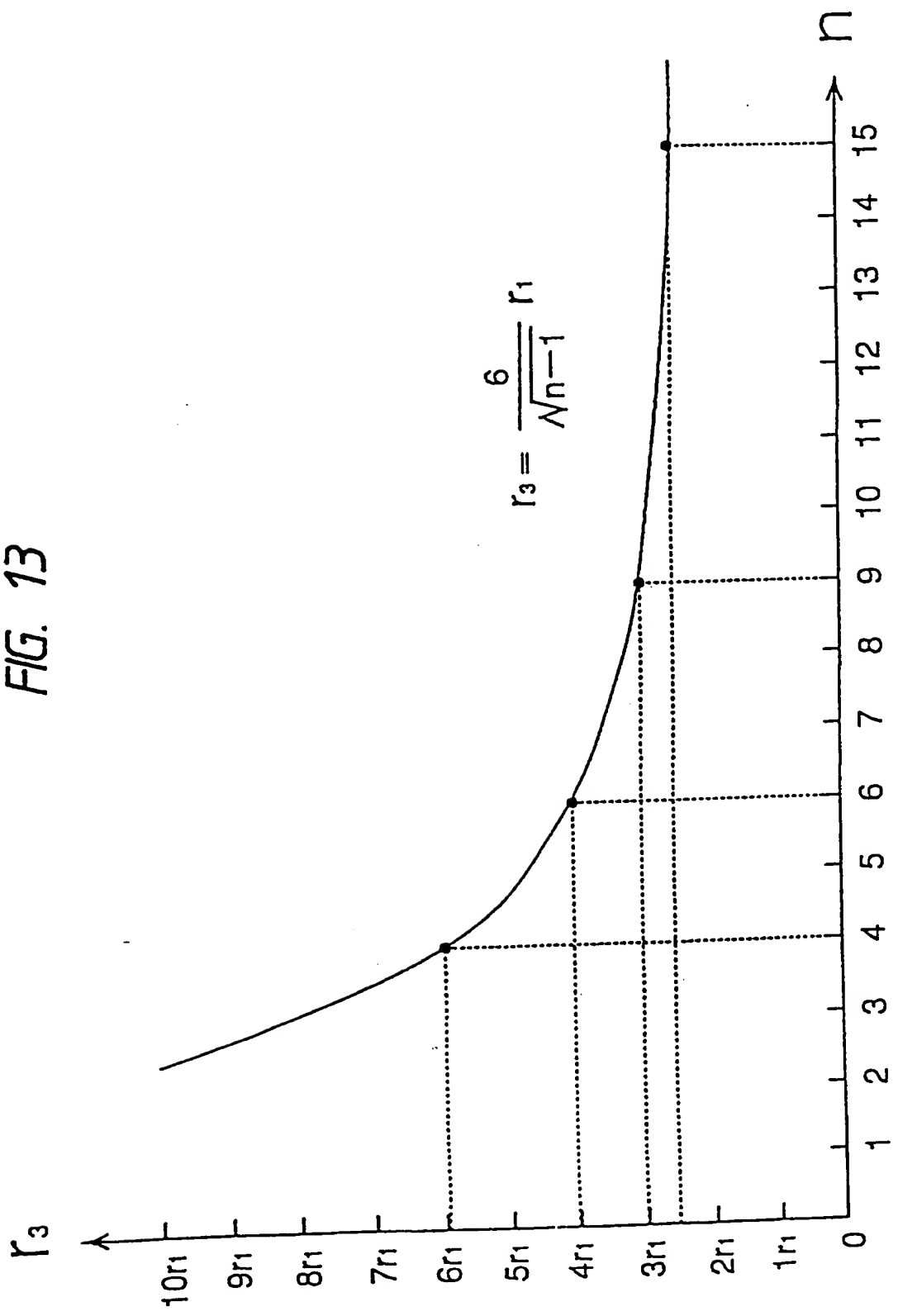

$r_3 = \frac{6}{\sqrt{n-1}} r_1$
r_3
$10r_1$
$9r_1$
$8r_1$
$7r_1$
$6r_1$
$5r_1$
$4r_1$
$3r_1$
$2r_1$
$1r_1$
0
n
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

FIG. 13

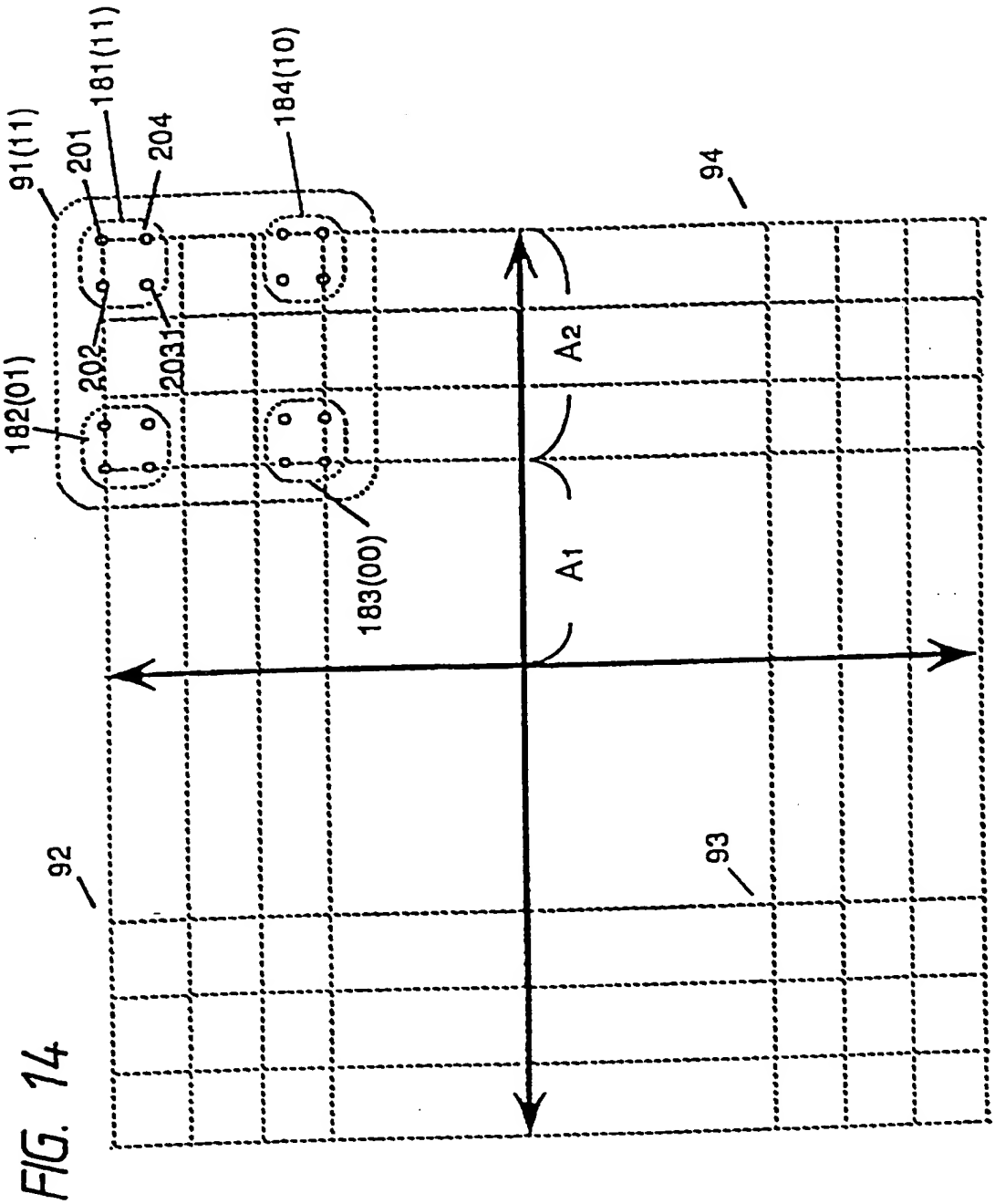


FIG. 14

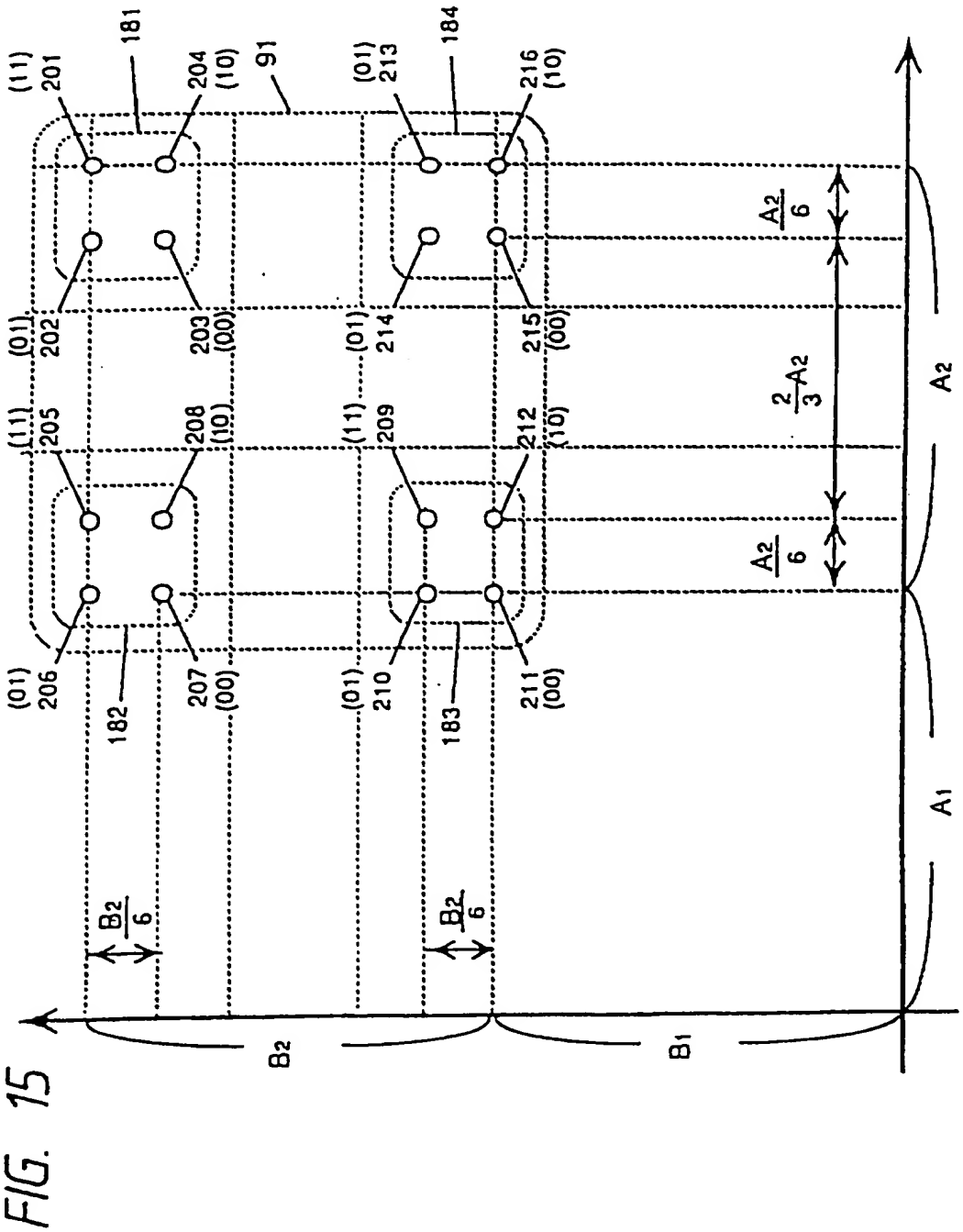

181
184
91
(11) 201
204 (10)
(01) 213
216 (10)
(01) 202
203 (00)
(01) 214
215 (00)
(11) 205
208 (10)
(11) 209
212 (10)
(01) 206
207 (00)
(01) 210
211 (00)
182
183
A2/6
2/3 A2
A2/6
A2
A1
B2/6
B2/6
B2
B1

FIG. 15

FIG. 16

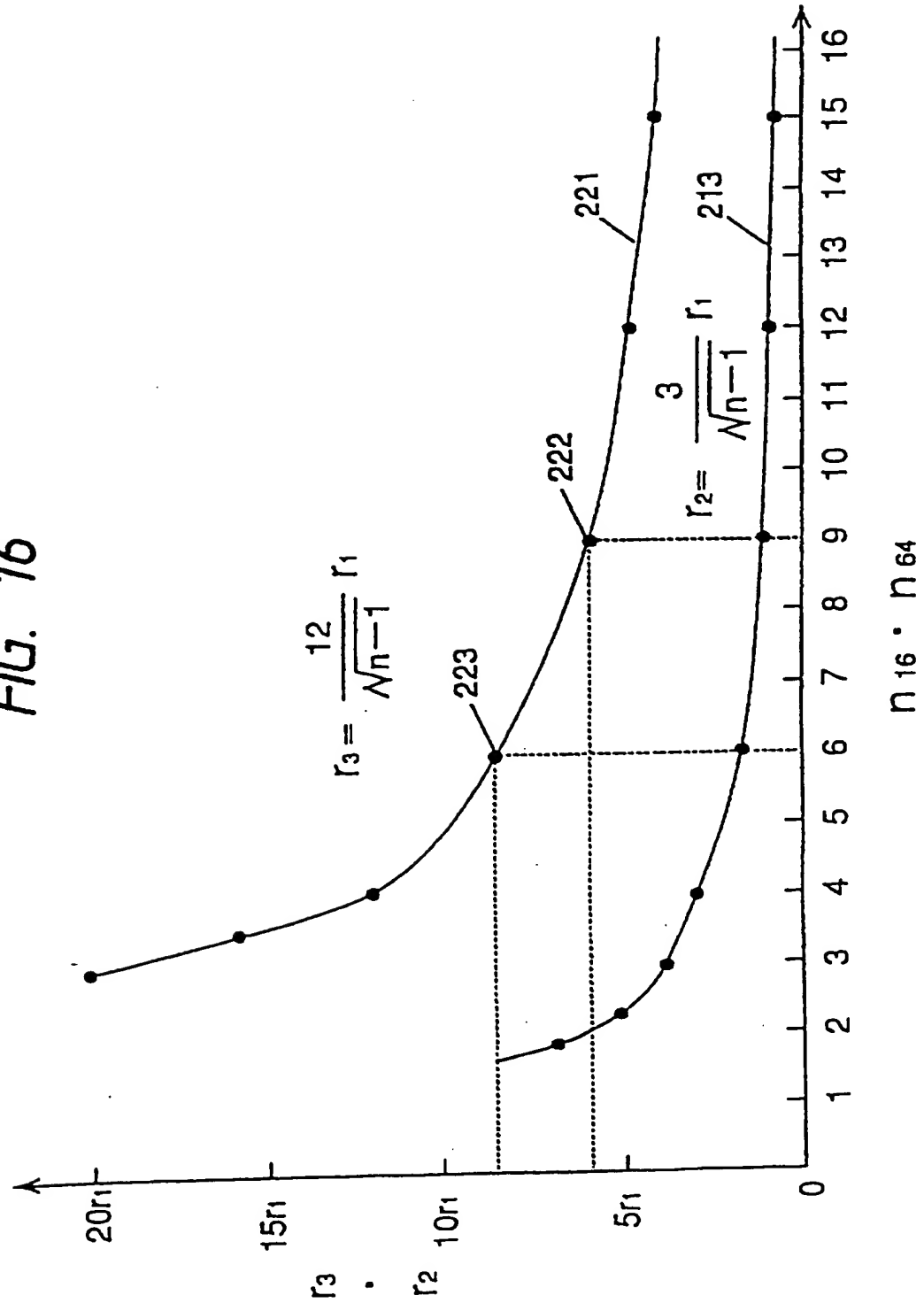
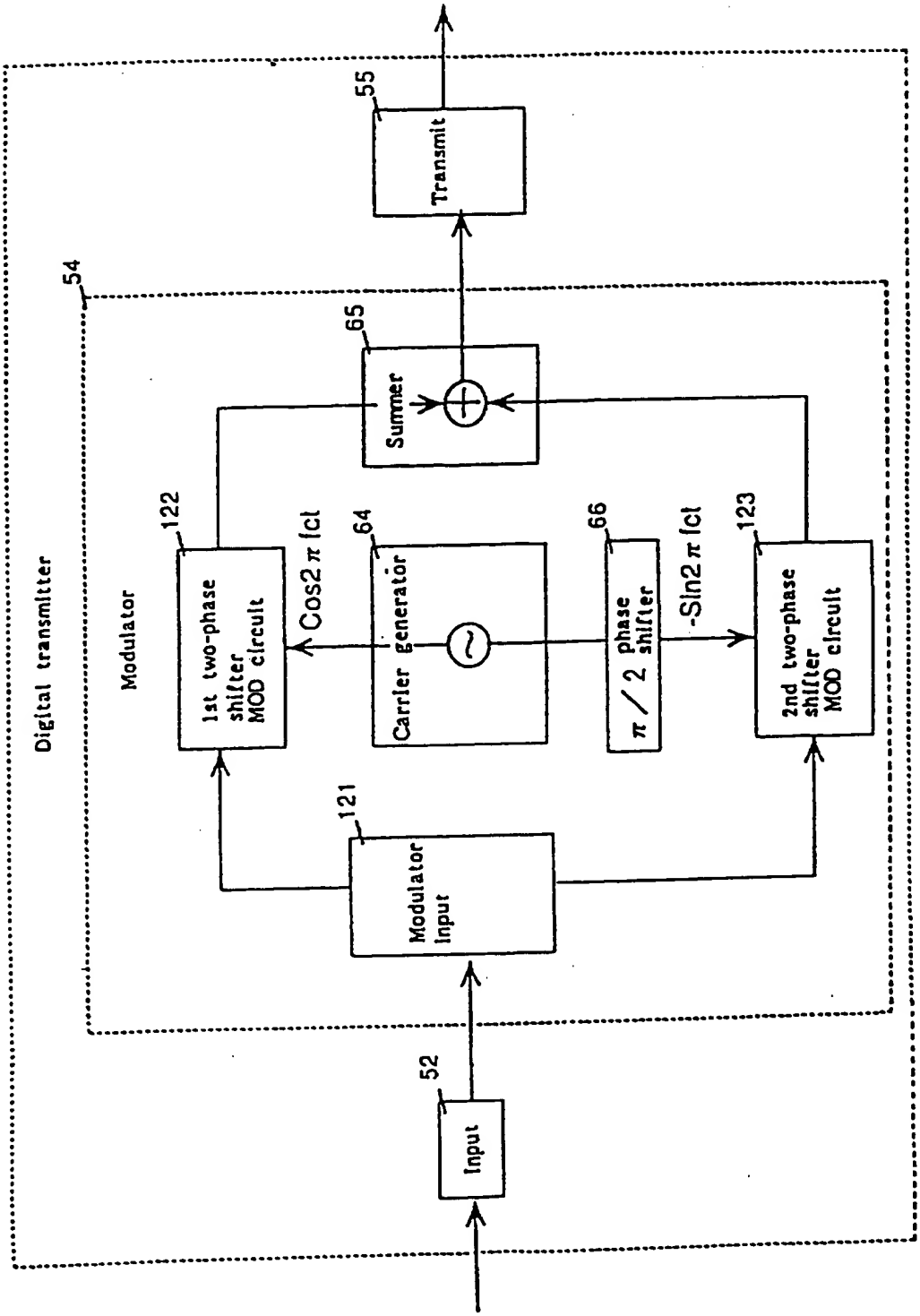

$r_3 = \frac{12}{\sqrt{n-1}} r_1$
$r_2 = \frac{3}{\sqrt{n-1}} r_1$
221
222
223
213
20r1
15r1
10r1
5r1
0
r3 • r2
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
n16 • n64

FIG. 17


Digital transmitter
Modulator
54
Transmit
55
Summer
65
1st two-phase shifter MOD circuit
122
Cos2πfct
Carrier generator
64
π/2 phase shifter
66
-Sin2πfct
2nd two-phase shifter MOD circuit
123
Modulator Input
121
Input
52

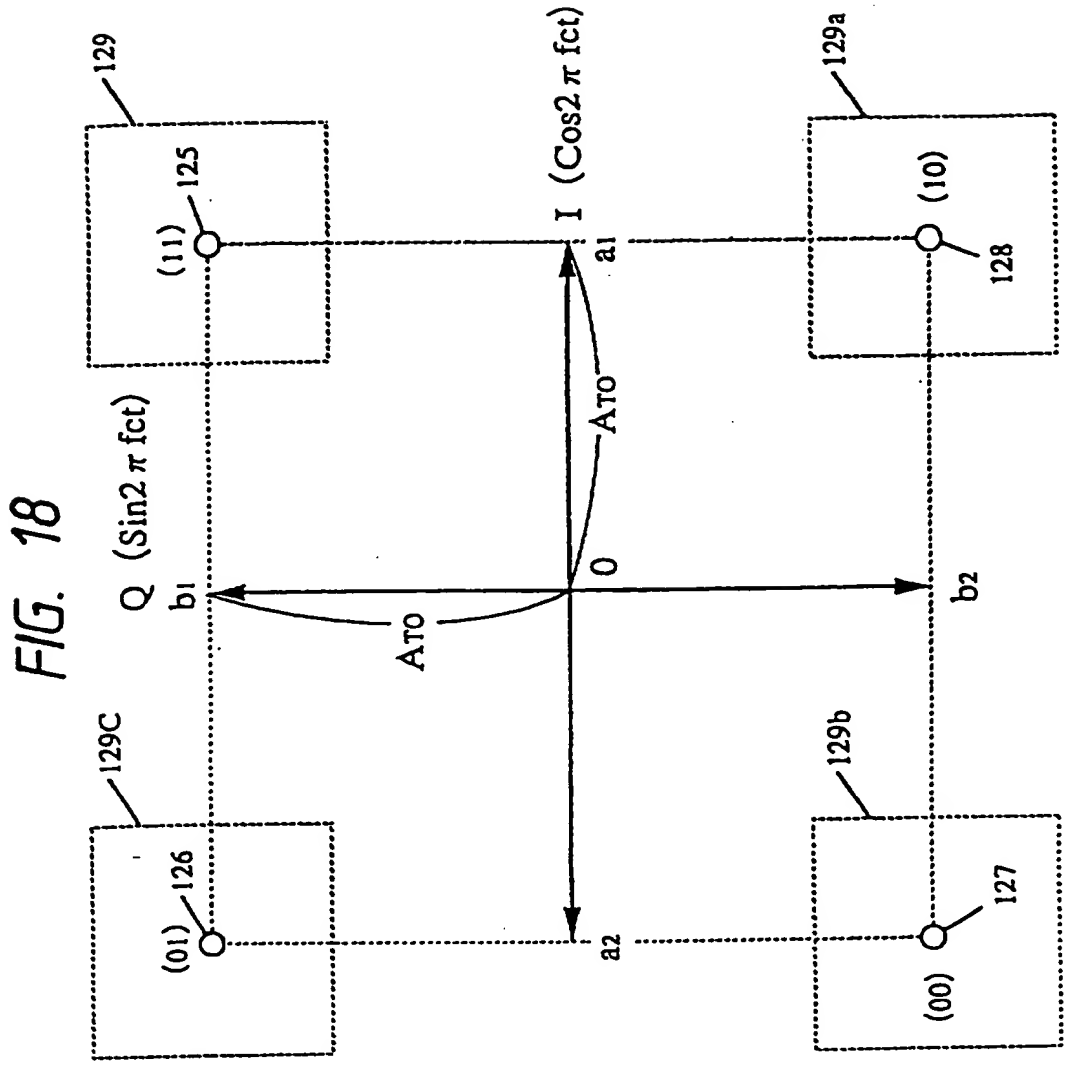
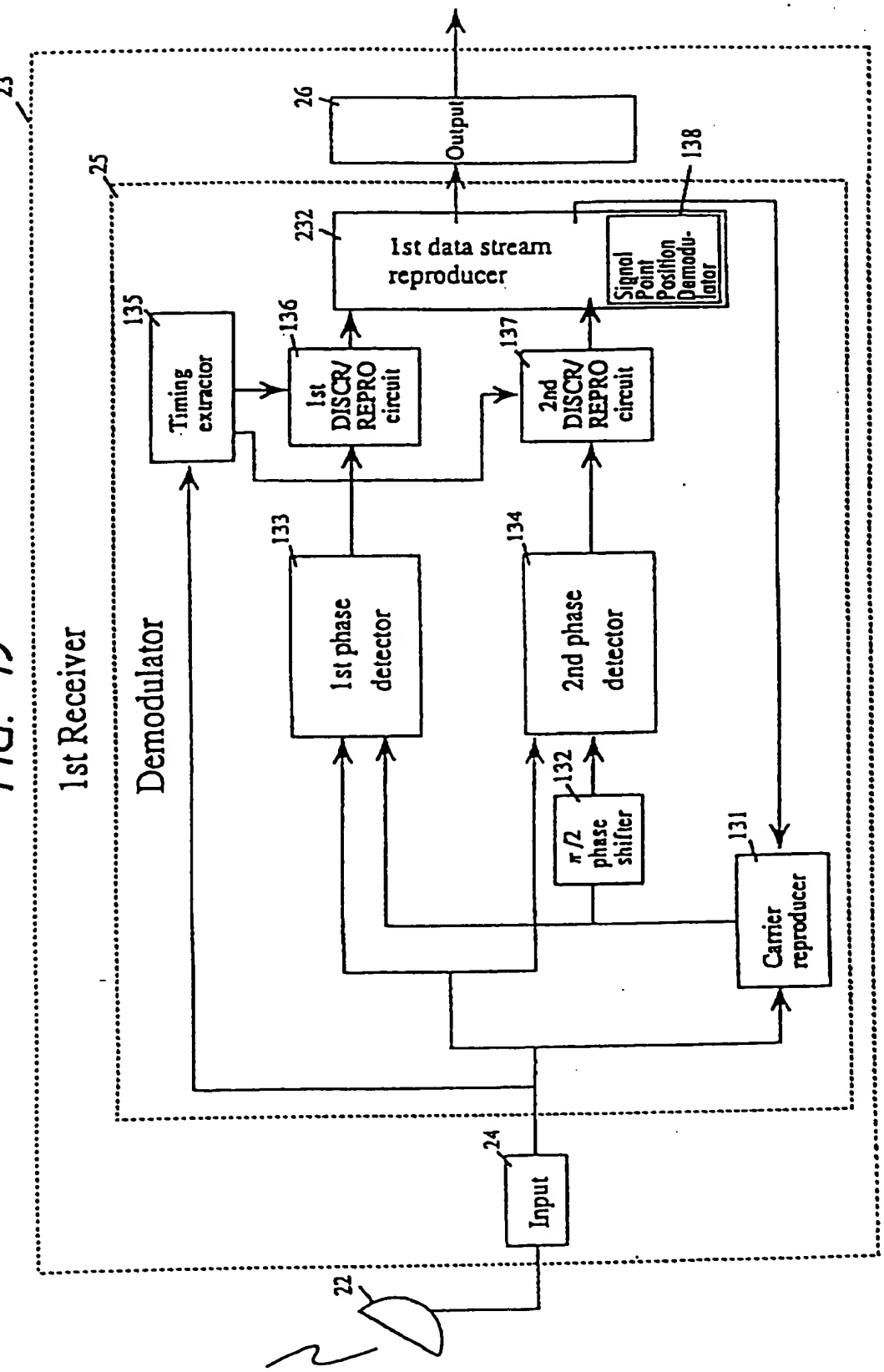

129
125
(11)
I (Cos2 π fct)
129a
(10)
128
a1
ATO
Q (Sin2 π fct)
b1
0
b2
ATO
129C
126
(01)
a2
129b
127
(00)

FIG. 18

FIG. 19


23
1st Receiver
Demodulator
25
26
Output
138
232
1st data stream reproducer
Signal Point Position Demodulator
135
Timing extractor
136
1st DISCR/ REPRO circuit
137
2nd DISCR/ REPRO circuit
133
1st phase detector
134
2nd phase detector
132
π/2 phase shifter
131
Carrier reproducer
24
Input
22

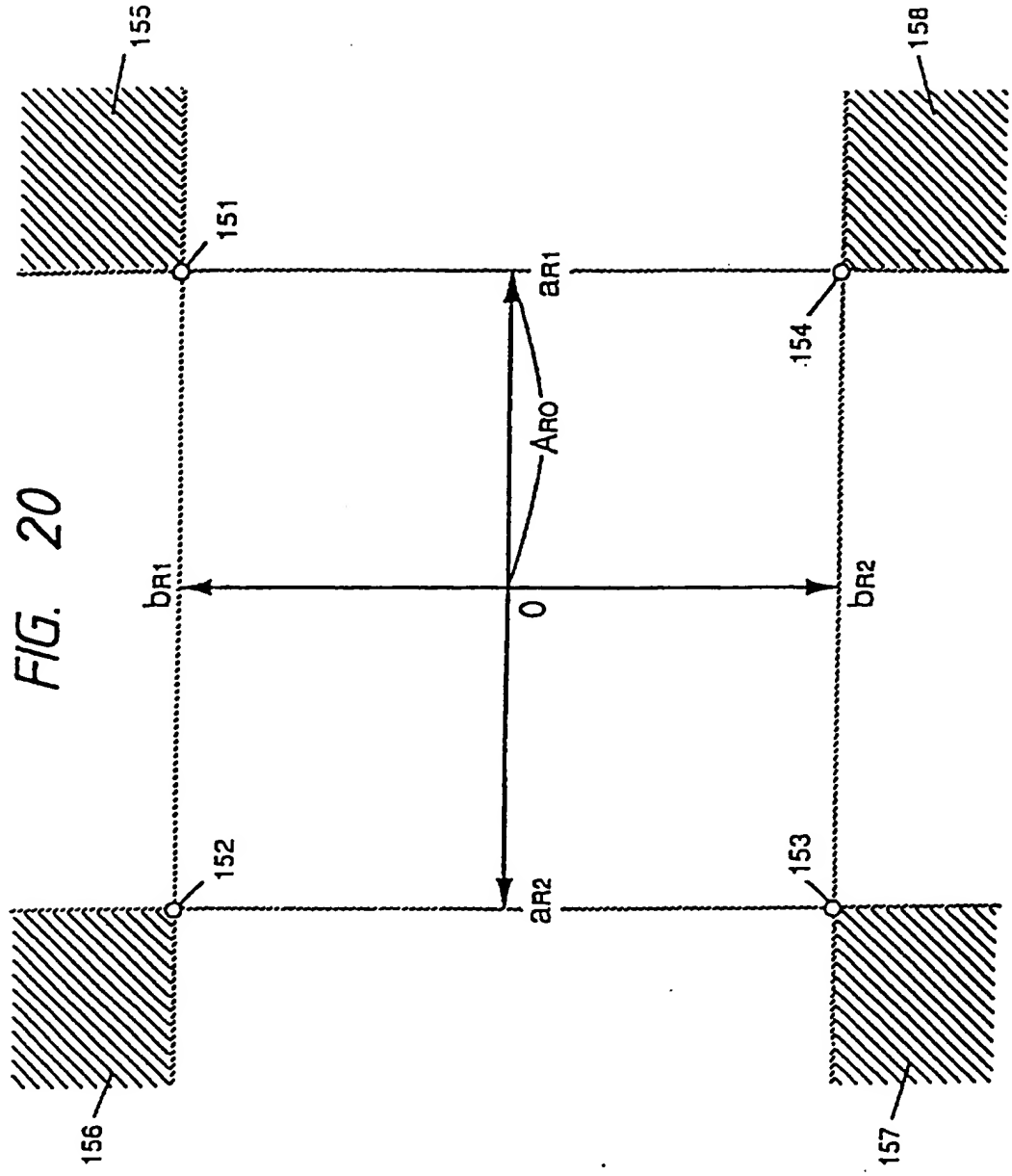


FIG. 20

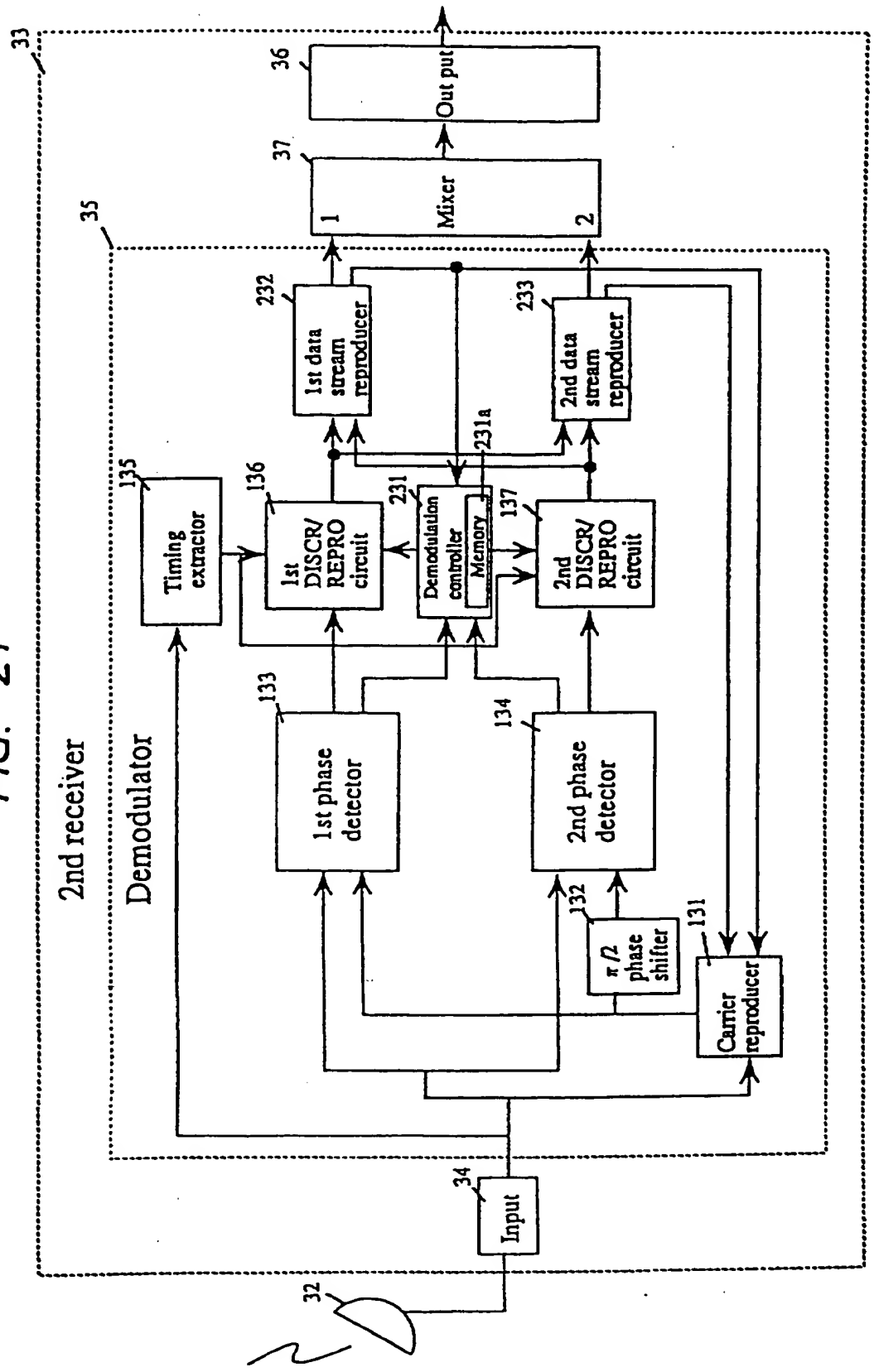

33
36
Out put
37
Mixer
1
2
35
232
1st data stream reproducer
233
2nd data stream reproducer
231a
135
Timing extractor
136
1st DISCR/ REPRO circuit
231
Demodulation controller
Memory
137
2nd DISCR/ REPRO circuit
133
1st phase detector
134
2nd phase detector
132
π/2 phase shifter
131
Carrier reproducer
2nd receiver
Demodulator
34
Input
32

FIG. 21

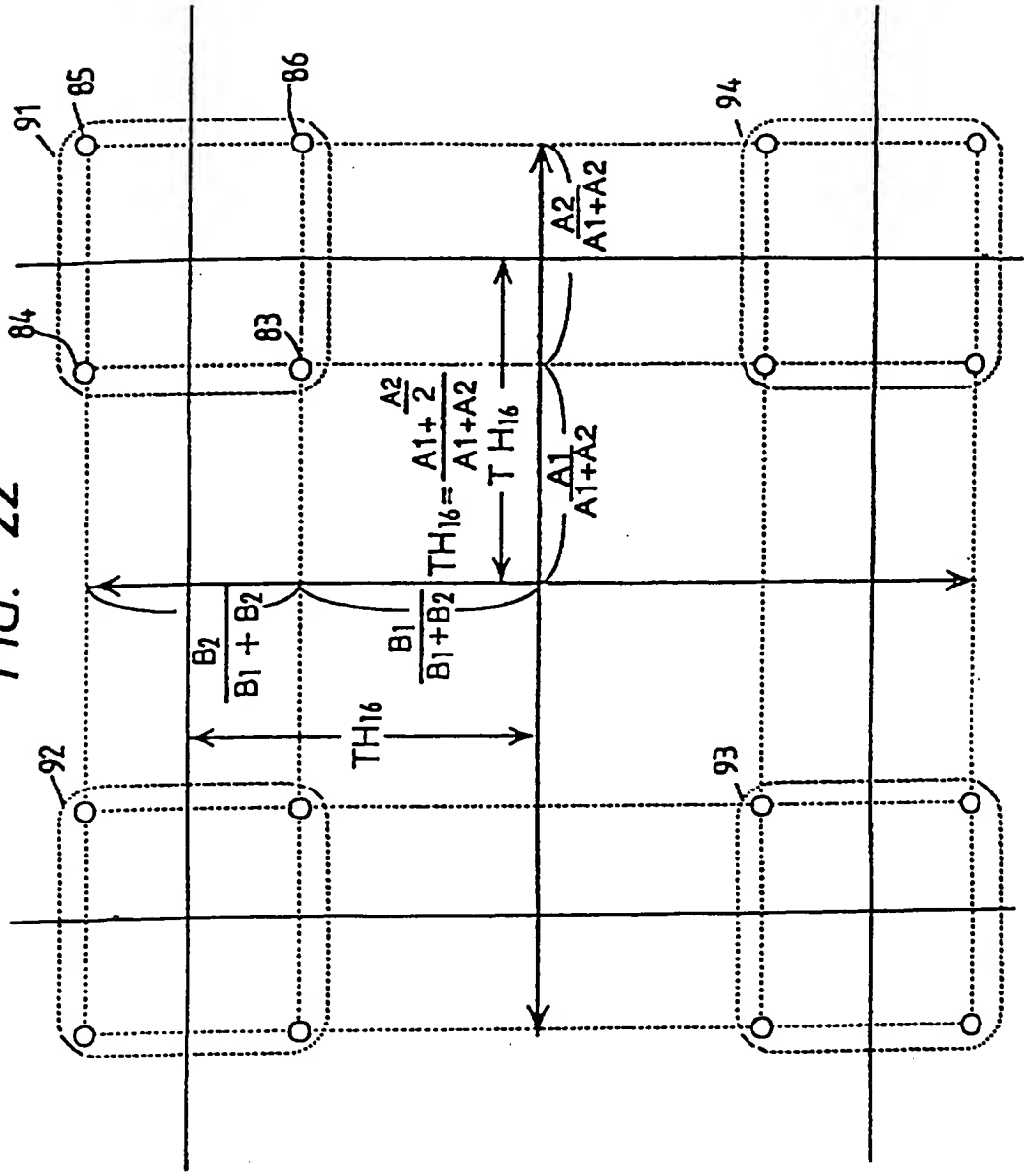

91
85
86
94
84
83
92
93
$\frac{A2}{A1+A2}$
$\frac{A1}{A1+A2}$
$TH_{16} = \frac{A1+\frac{A2}{2}}{A1+A2} T H_{16}$
$\frac{B2}{B1+B2}$
$\frac{B1}{B1+B2}$
TH_{16}

FIG. 22

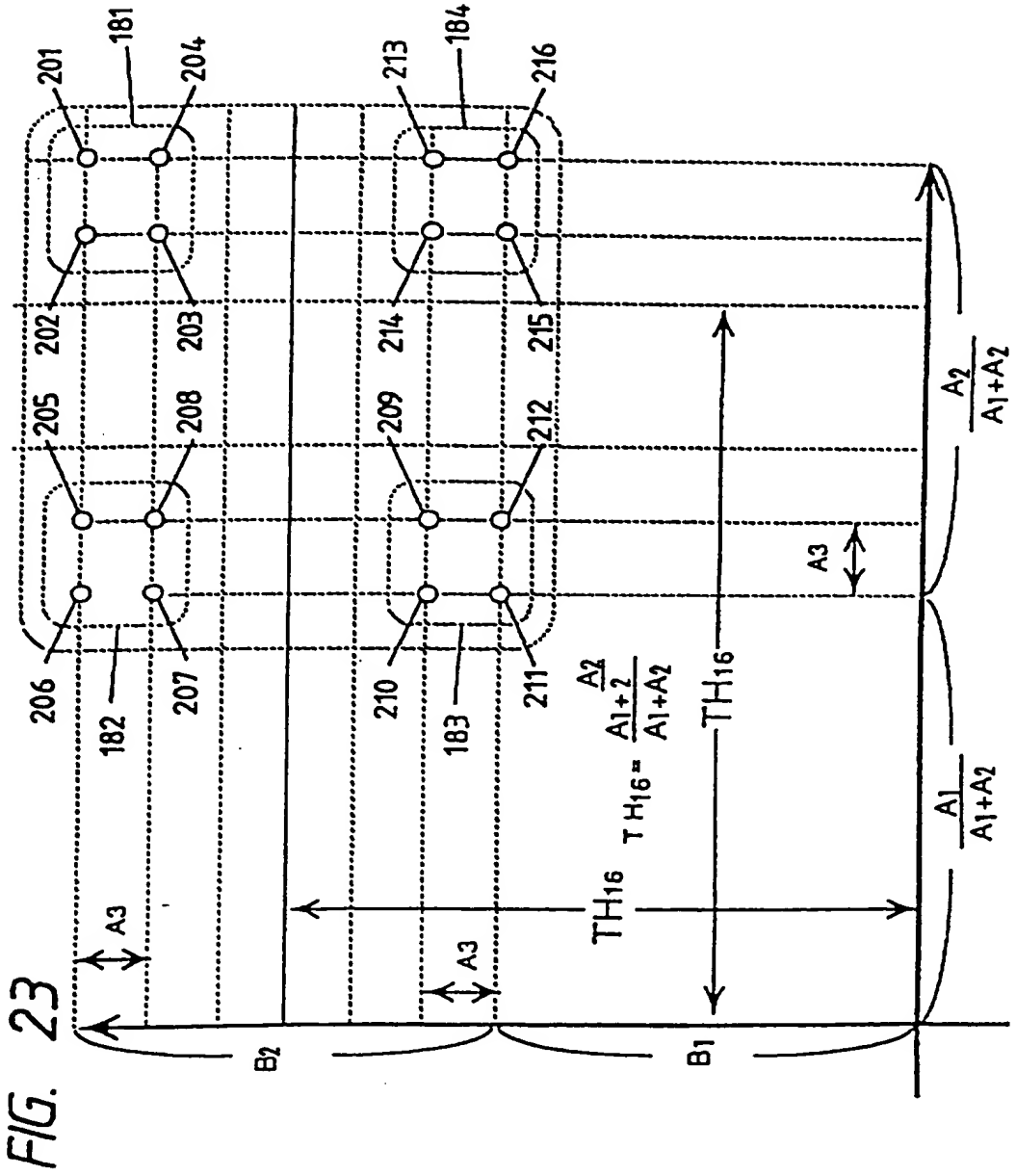

201
181
204
213
184
216
202
203
214
215
205
208
209
212
206
182
207
210
183
211
A3
A3
A3
TH16
TH16 = A2/(A1+2) / A1+A2
A2/(A1+A2)
A1/(A1+A2)
B2
B1

FIG. 23

FIG. 24

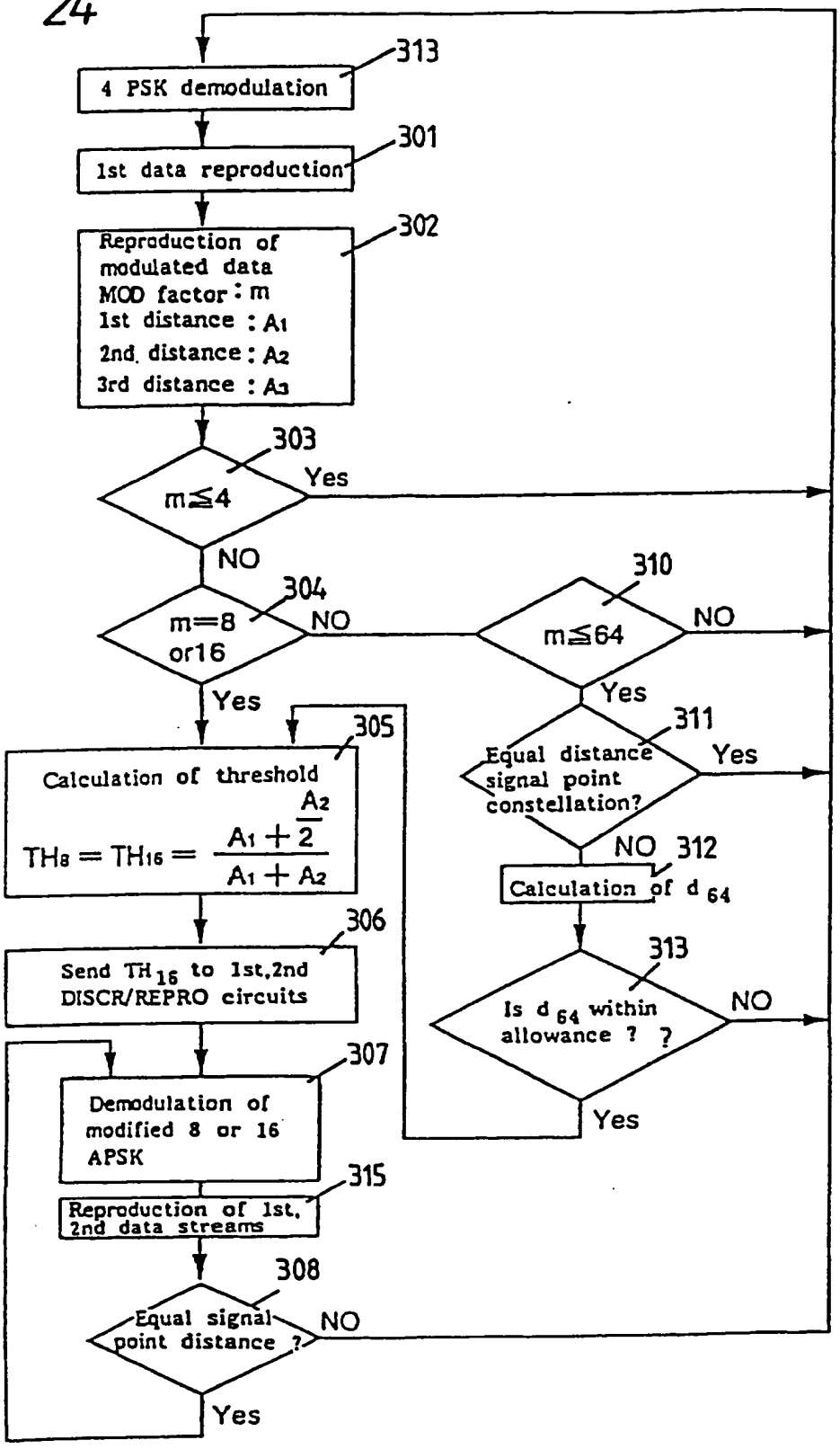

313
4 PSK demodulation
301
1st data reproduction
302
Reproduction of modulated data
MOD factor : m
1st distance : A1
2nd. distance : A2
3rd distance : A3
303
m≦4
Yes
NO
304
m=8 or16
NO
Yes
310
m≦64
NO
Yes
311
Equal distance signal point constellation?
Yes
NO 312
Calculation of d 64
313
Is d 64 within allowance ? ?
NO
Yes
305
Calculation of threshold
TH8 = TH16 = (A1 + A2/2) / (A1 + A2)
306
Send TH16 to 1st,2nd DISCR/REPRO circuits
307
Demodulation of modified 8 or 16 APSK
315
Reproduction of 1st, 2nd data streams
308
Equal signal point distance ?
NO
Yes

FIG. 25(a)

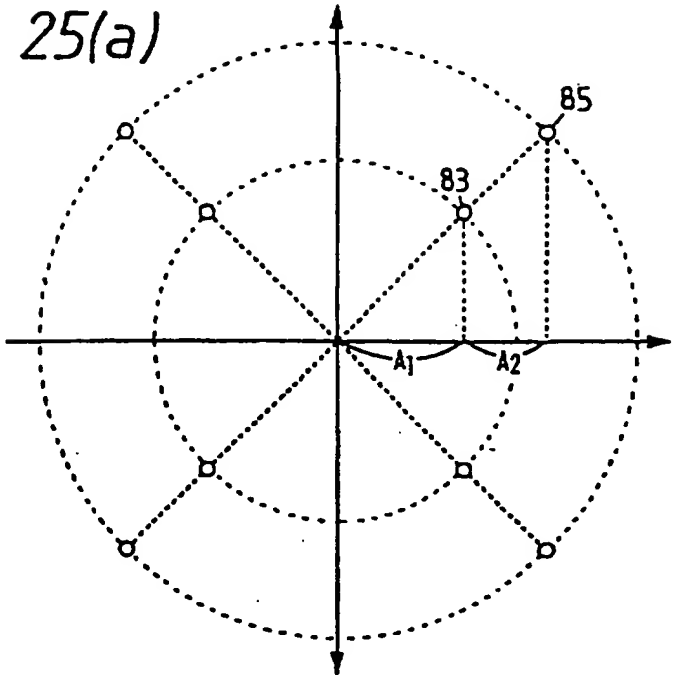
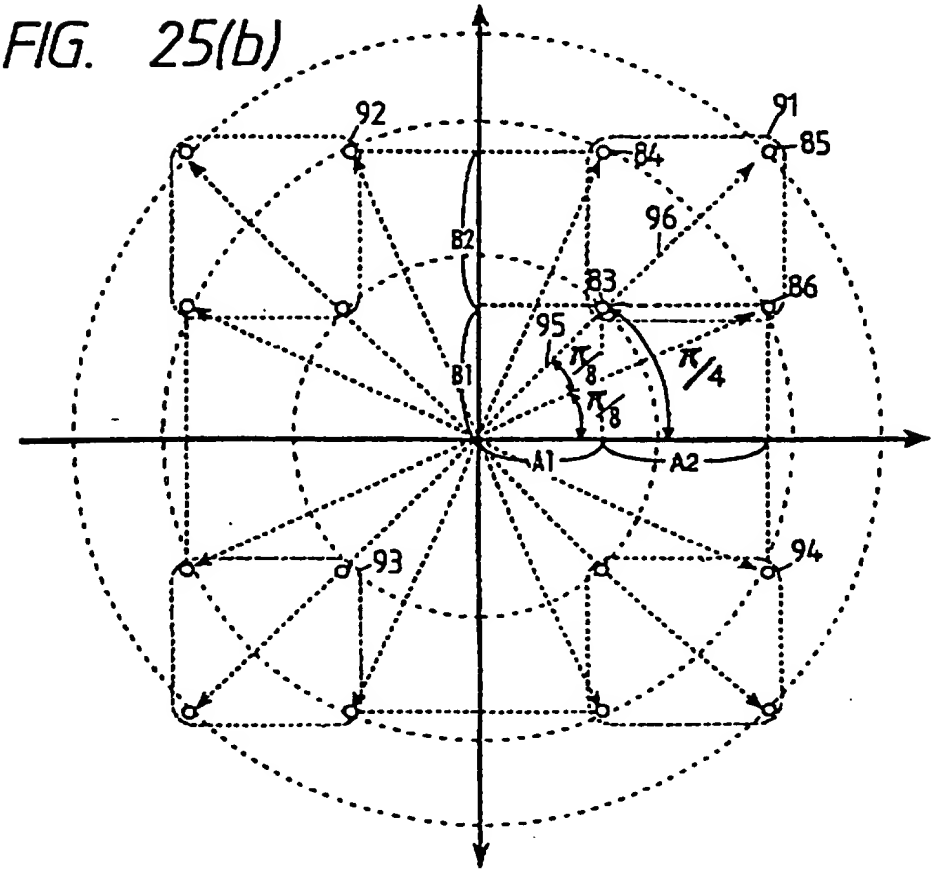


FIG. 25(b)



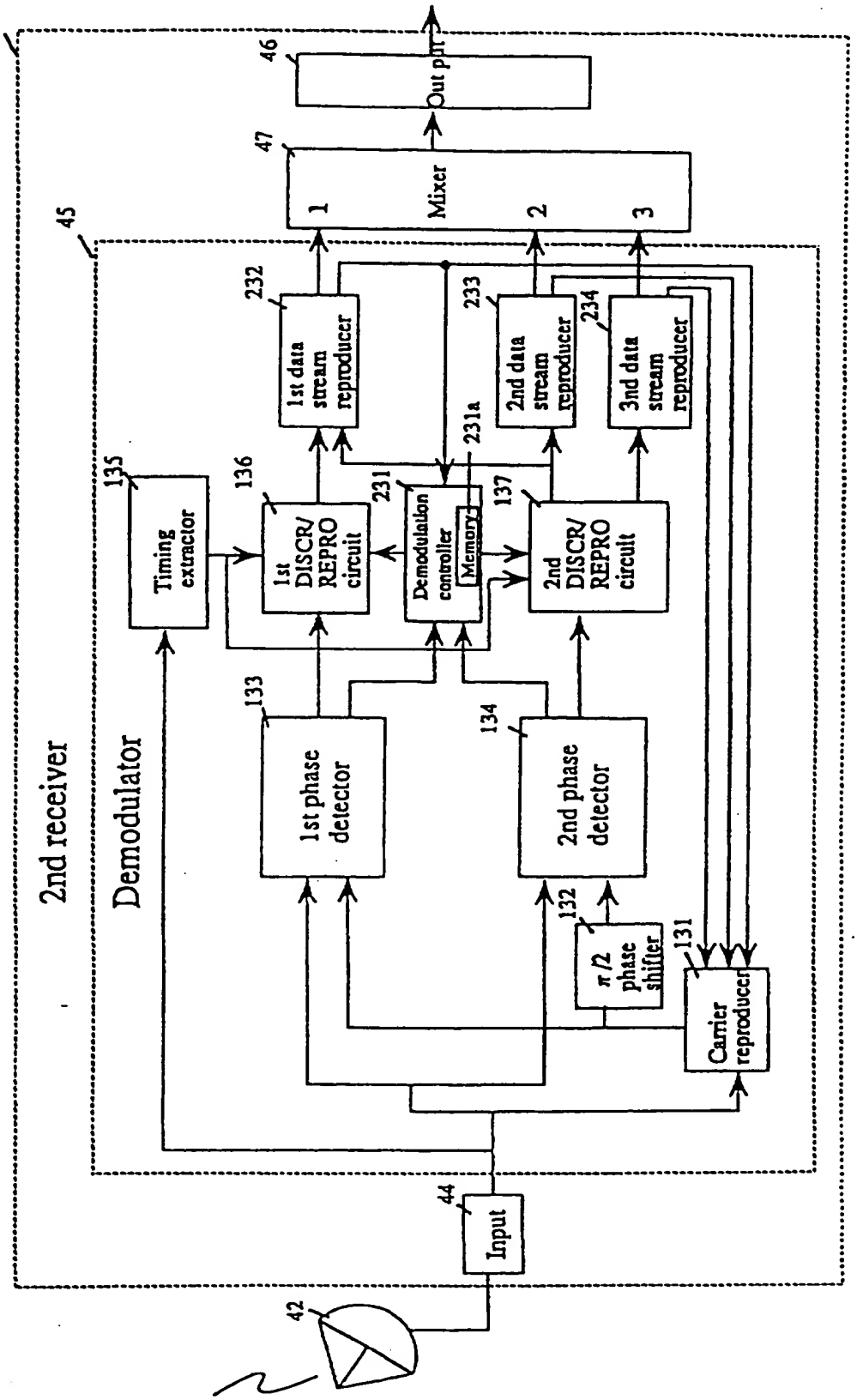

43
46
Out put
47
Mixer
1
2
3
45
232
1st data stream reproducer
233
2nd data stream reproducer
234
3nd data stream reproducer
231a
135
Timing extractor
136
1st DISCR/ REPRO circuit
231
Demodulation controller
Memory
137
2nd DISCR/ REPRO circuit
133
1st phase detector
134
2nd phase detector
132
π/2 phase shifter
131
Carrier reproducer
2nd receiver
Demodulator
44
Input
42

FIG. 26

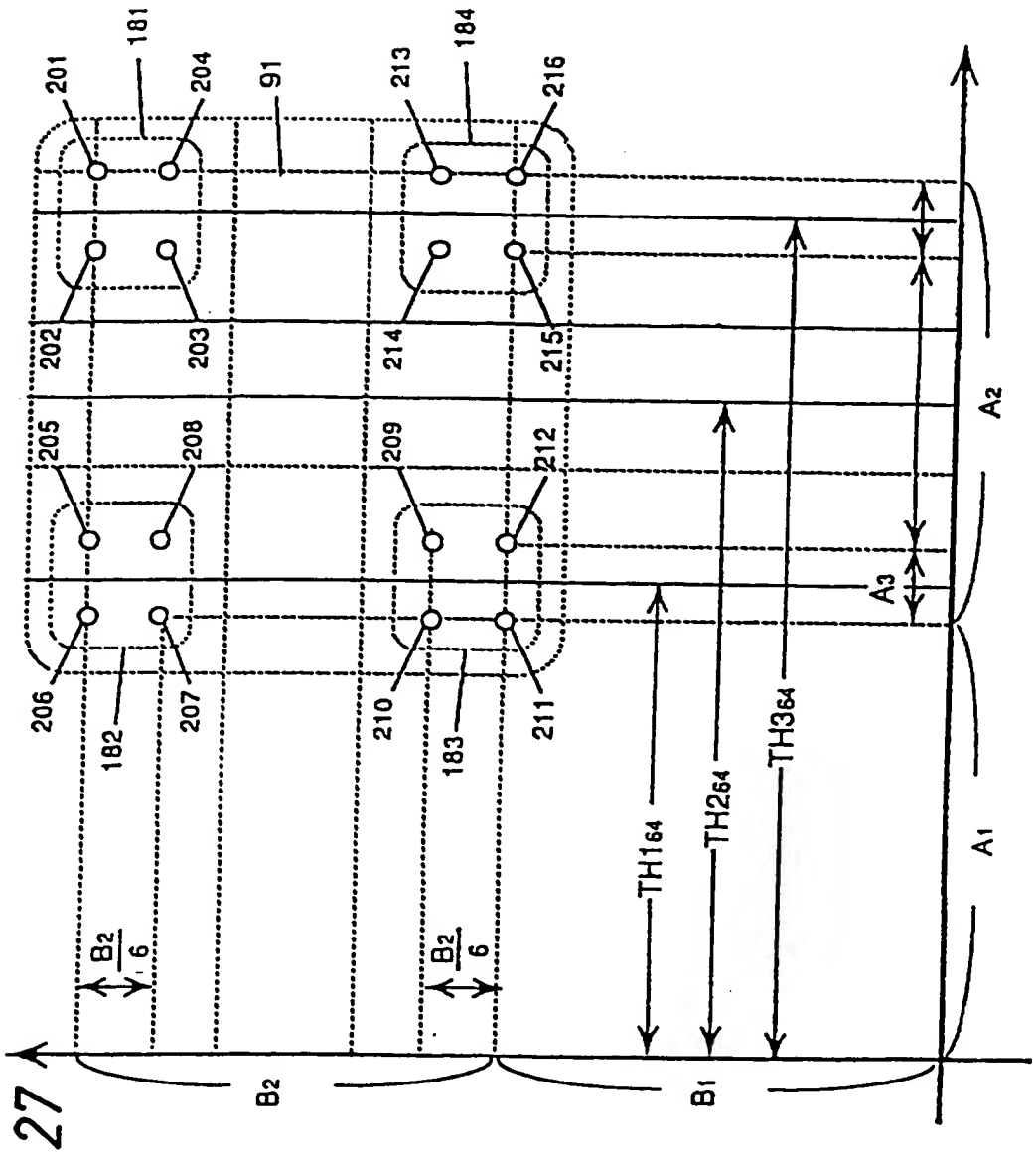

181
184
201
204
91
213
216
202
203
214
215
205
208
209
212
206
182
207
210
183
211
A2
A3
A1
TH164
TH264
TH364
B2/6
B2/6
B2
B1

FIG. 27

FIG. 28

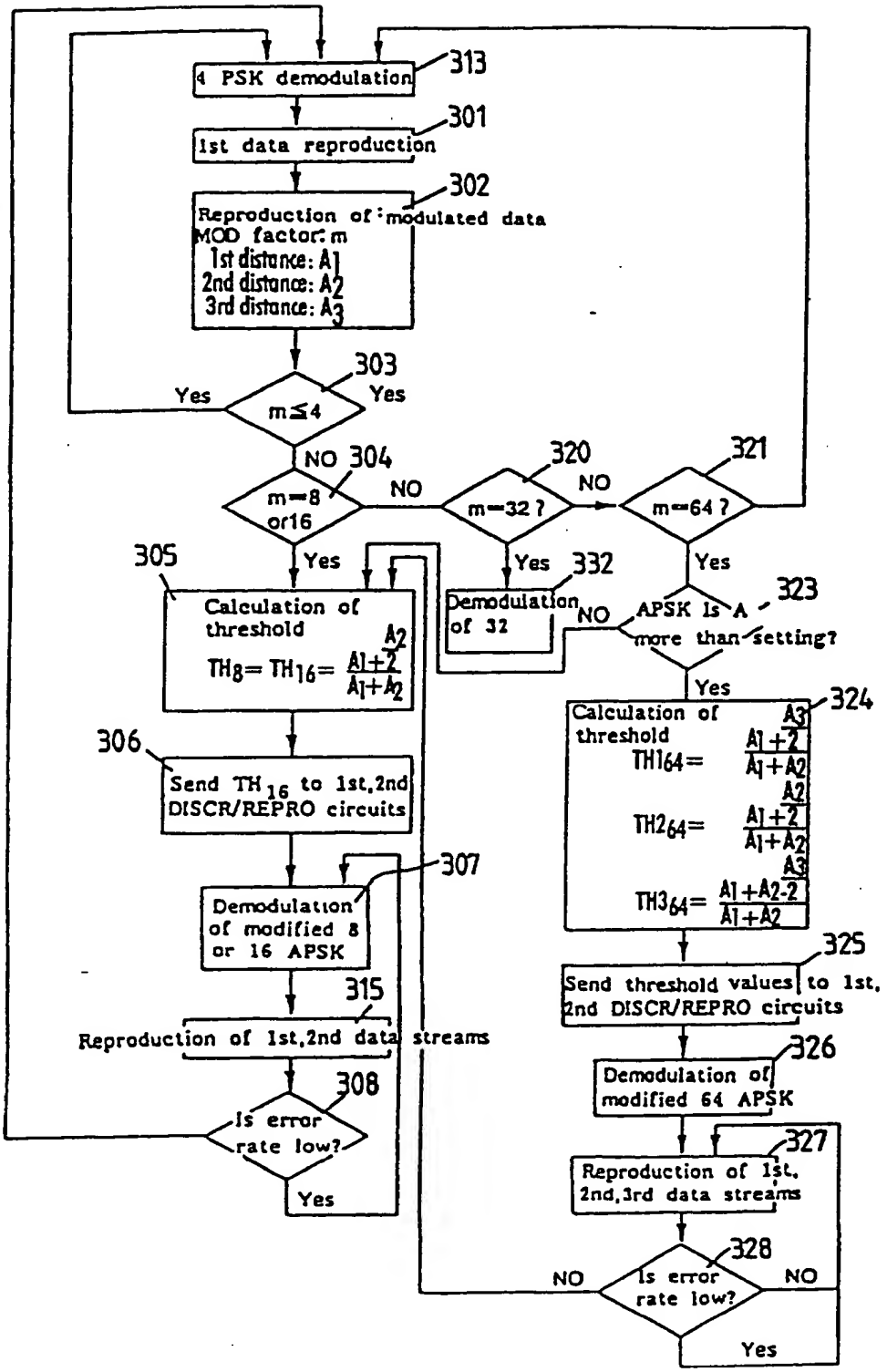

4 PSK demodulation
313
1st data reproduction
301
Reproduction of modulated data
MOD factor: m
1st distance: A1
2nd distance: A2
3rd distance: A3
302
m≤4
303
Yes
NO
m=8 or16
304
NO
m=32 ?
320
NO
m=64 ?
321
Yes
Yes
Yes
Calculation of threshold
TH8= TH16= (A1+2A2)/(A1+A2)
305
Demodulation of 32
332
APSK Is A more than setting?
323
NO
Yes
Send TH16 to 1st,2nd DISCR/REPRO circuits
306
Calculation of threshold
TH164= (A1+2A3)/(A1+A2)
TH264= (A1+2A2)/(A1+A2)
TH364= (A1+A2-2A3)/(A1+A2)
324
Demodulation of modified 8 or 16 APSK
307
Send threshold values to 1st, 2nd DISCR/REPRO circuits
325
Reproduction of 1st,2nd data streams
315
Demodulation of modified 64 APSK
326
Is error rate low?
308
Yes
Reproduction of 1st, 2nd,3rd data streams
327
Is error rate low?
328
NO
NO
Yes

FIG. 29

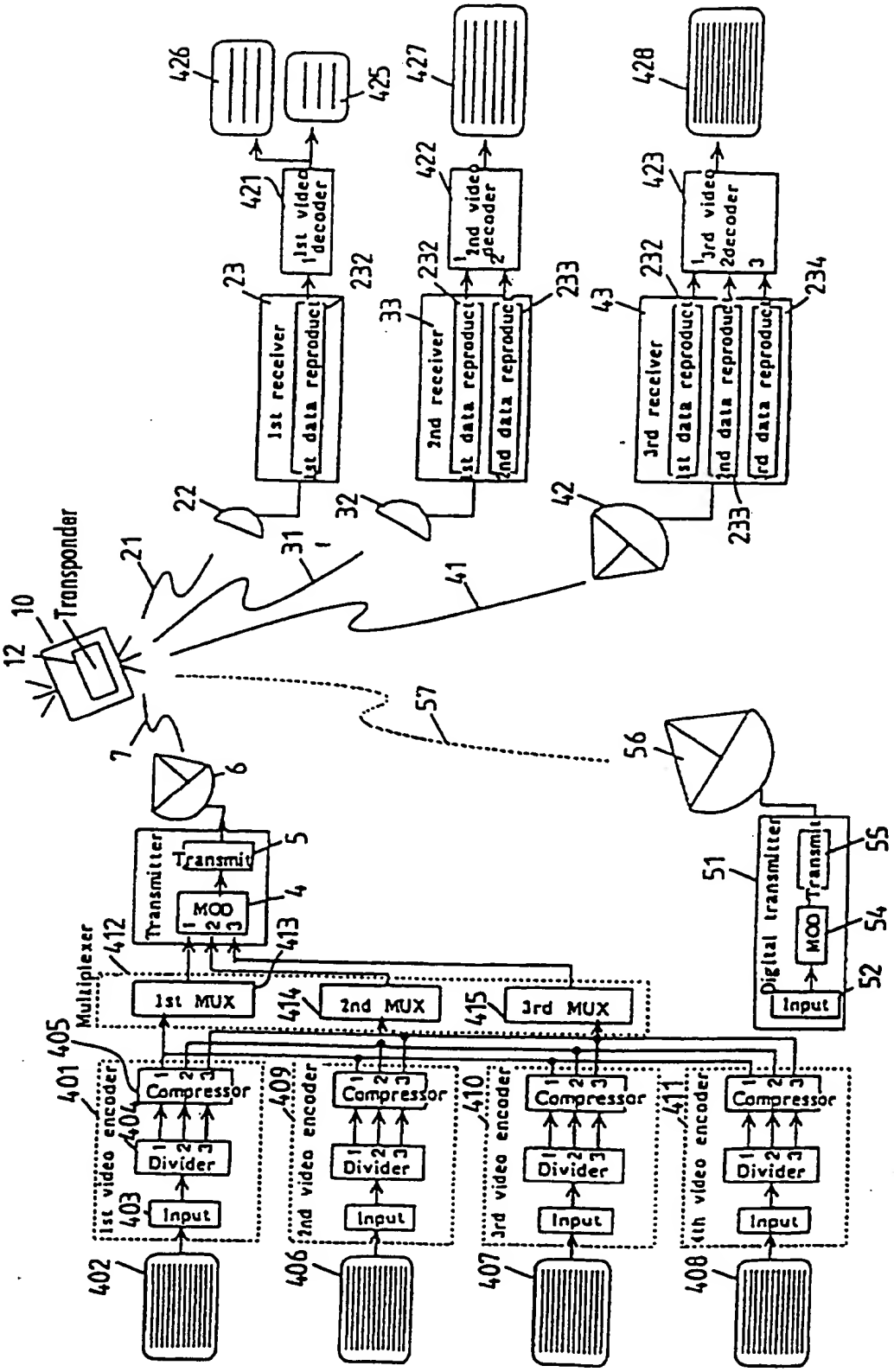
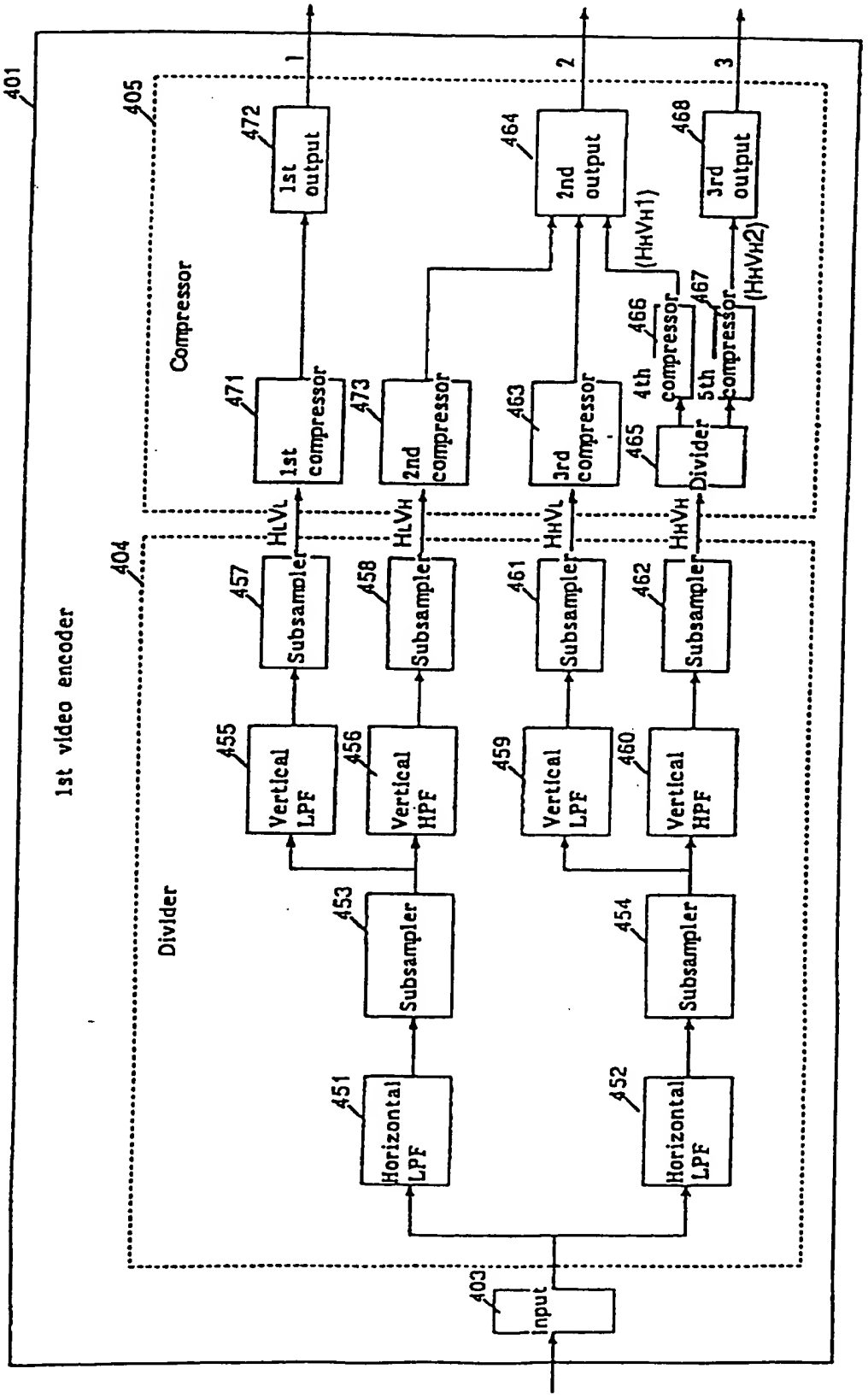

Transponder
10
12
21
22
31
32
41
42
57
56
6
7
Transmitter
Transmit
MOD
5
4
Multiplexer
412
413
1st MUX
2nd MUX
3rd MUX
414
415
405
401
1st video encoder
409
2nd video encoder
410
3rd video encoder
411
4th video encoder
Compressor
404
Divider
403
Input
402
406
407
408
Digital transmitter
51
55
54
52
1st receiver
2nd receiver
3rd receiver
1st data reproduct
2nd data reproduc
3rd data reproduct
23
33
43
232
233
234
1st video decoder
2nd video decoder
3rd video decoder
421
422
423
425
426
427
428

FIG. 30


401
1st video encoder
405
Compressor
404
Divider
403
Input
451
Horizontal LPF
452
Horizontal LPF
453
Subsampler
454
Subsampler
455
Vertical LPF
456
Vertical HPF
457
Subsampler
458
Subsampler
459
Vertical LPF
460
Vertical HPF
461
Subsampler
462
Subsampler
463
3rd compressor
464
2nd output
465
Divider
466
4th compressor
467
5th compressor
468
3rd output
471
1st compressor
472
1st output
473
2nd compressor
1
2
3
HLVL
HLVH
HHVL
HHVH
(HHVH1)
(HHVH2)

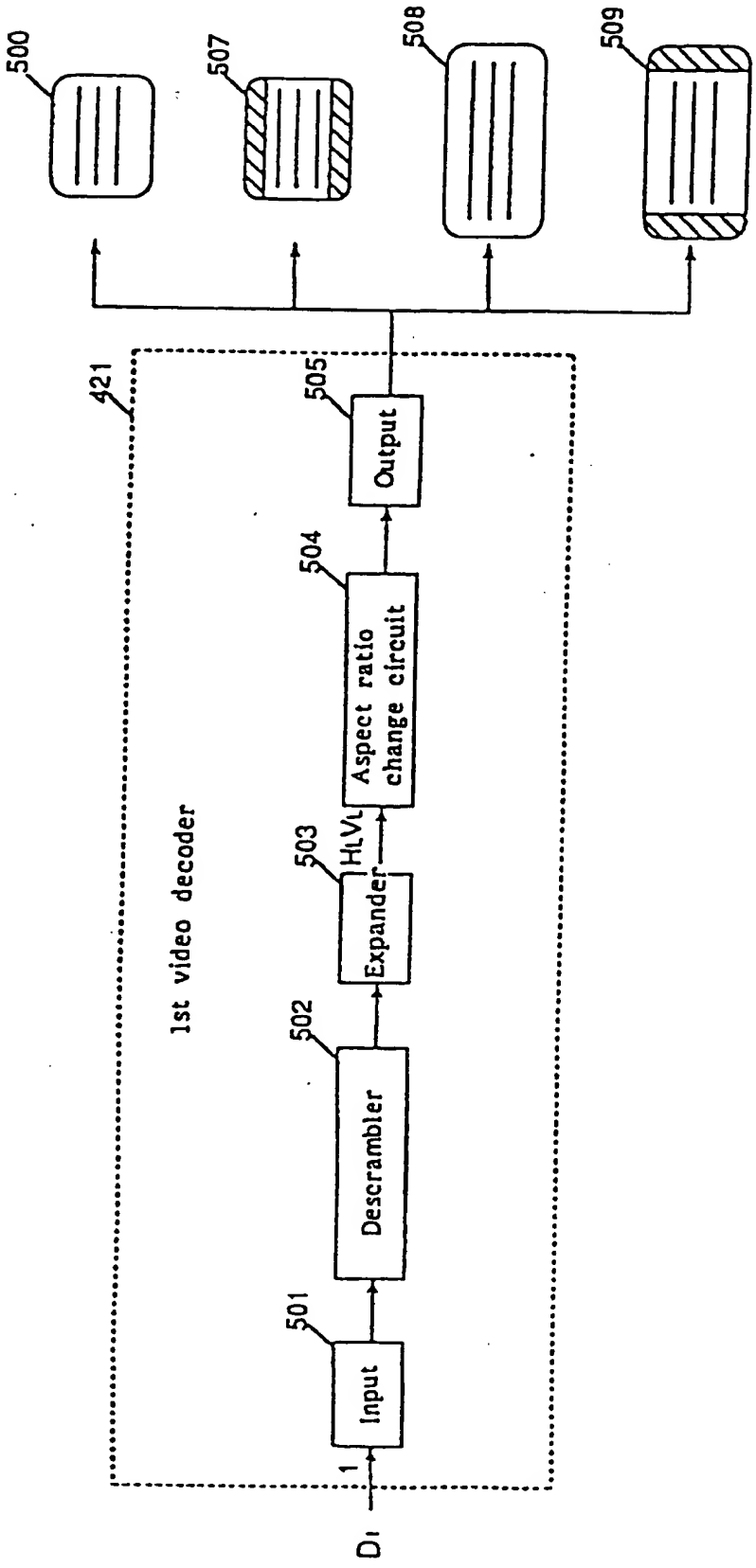

500
507
508
509
421
505
Output
504
Aspect ratio change circuit
503
HLVL
Expander
502
Descrambler
501
Input
1st video decoder
DI

FIG. 31

FIG. 32

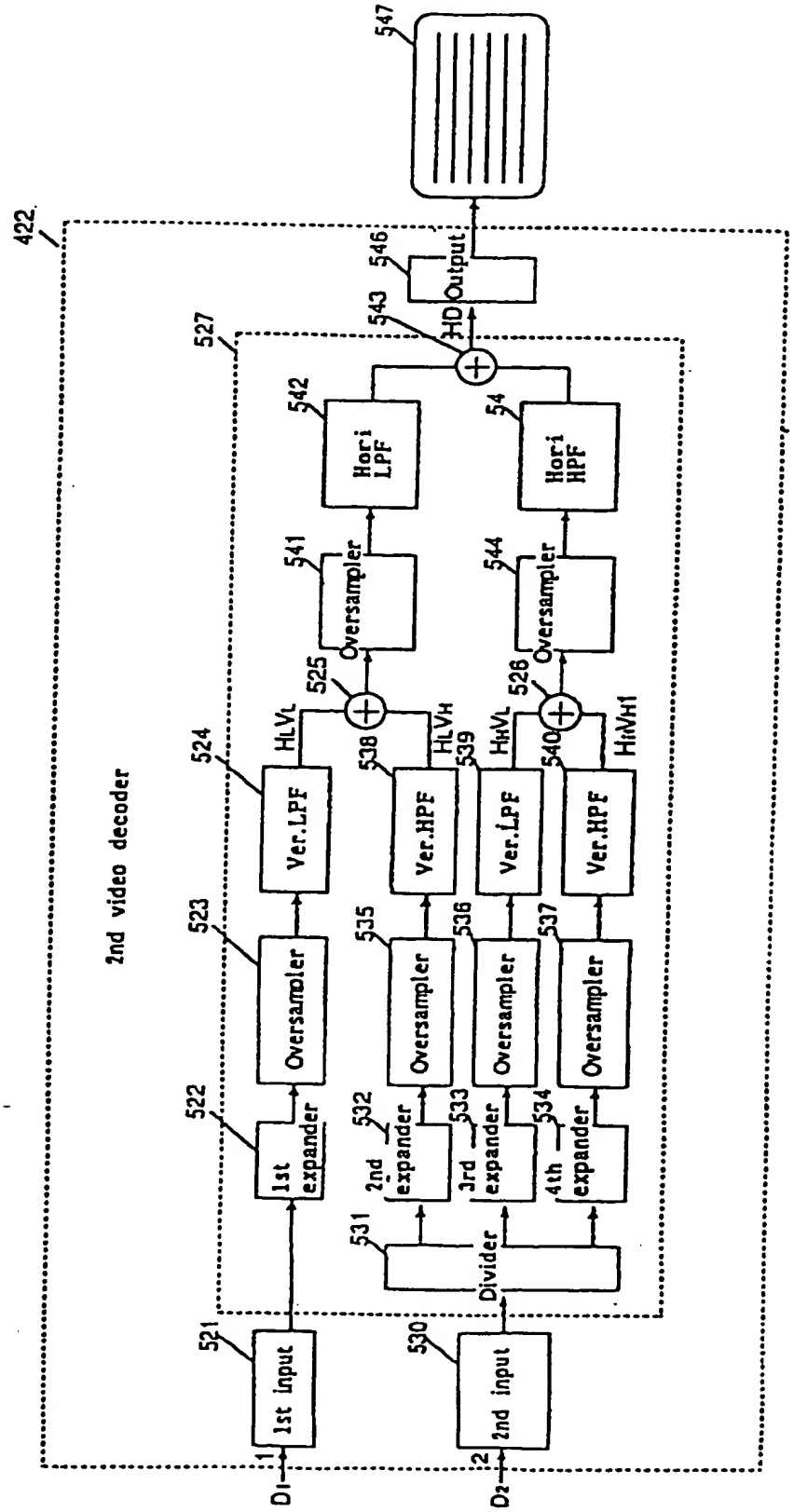
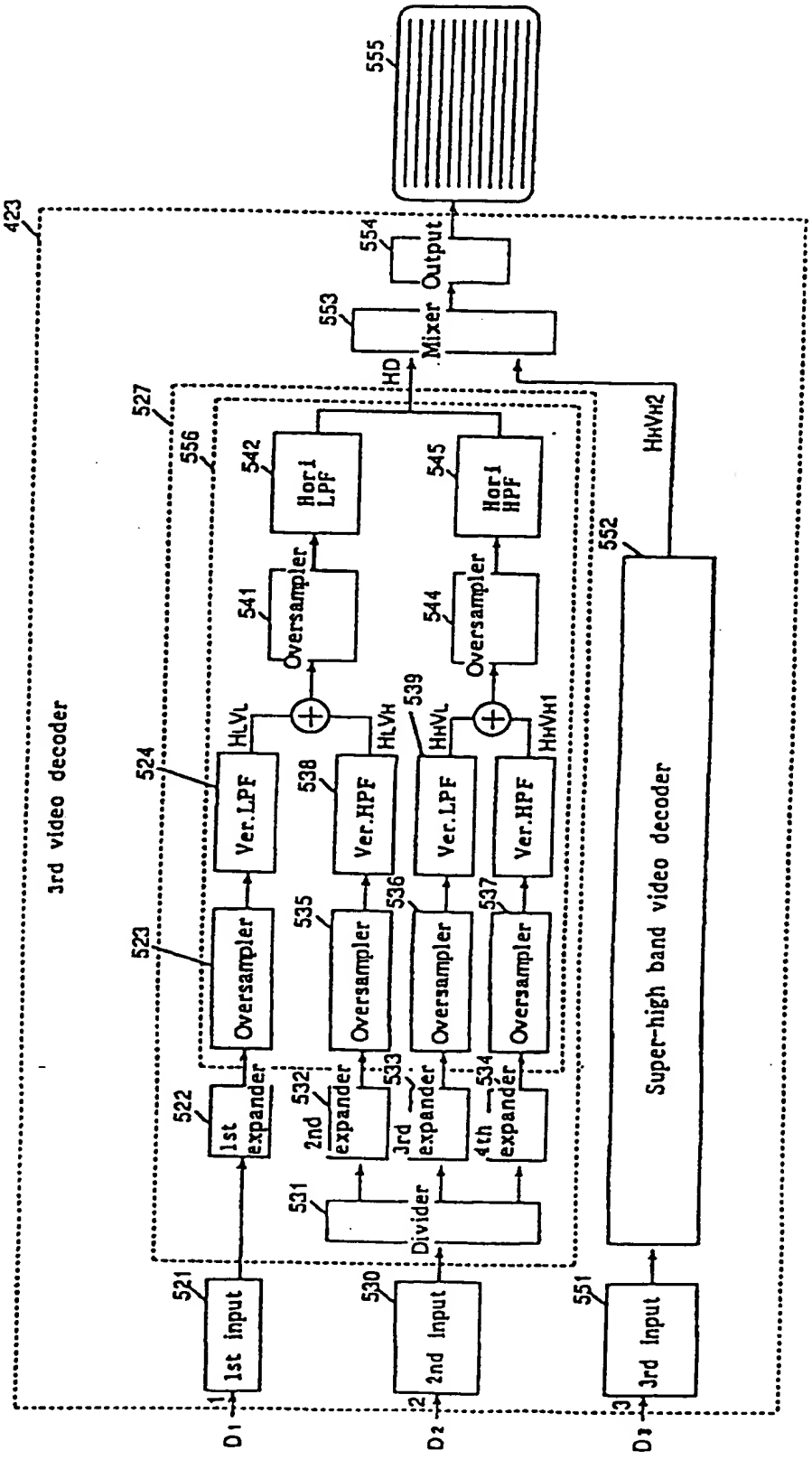

547
422
546
Output
543
HD
527
542
Hori LPF
54
Hori HPF
541
Oversampler
544
Oversampler
525
526
HLVL
HLVH
HHVL
HHVH
524
538
539
540
Ver.LPF
Ver.HPF
Ver.LPF
Ver.HPF
523
535
536
537
Oversampler
Oversampler
Oversampler
Oversampler
522
532
533
534
1st expander
2nd expander
3rd expander
4th expander
531
Divider
521
530
1st input
2nd input
1
2
D1
D2
2nd video decoder

FIG. 33


555
423
554
Output
553
Mixer
HD
527
556
542
Hor.1 LPF
545
Hor.1 HPF
HHVH2
552
541
Oversampler
544
Oversampler
539
HLVL
HLVH
HHVL
HHVH1
524
Ver.LPF
538
Ver.HPF
Ver.LPF
Ver.HPF
523
535
536
537
Oversampler
Oversampler
Oversampler
Oversampler
522
532
533
534
1st expander
2nd expander
3rd expander
4th expander
531
Divider
521
530
551
1st input
2nd input
3rd input
3rd video decoder
Super-high band video decoder
1
2
3
D1
D2
D3

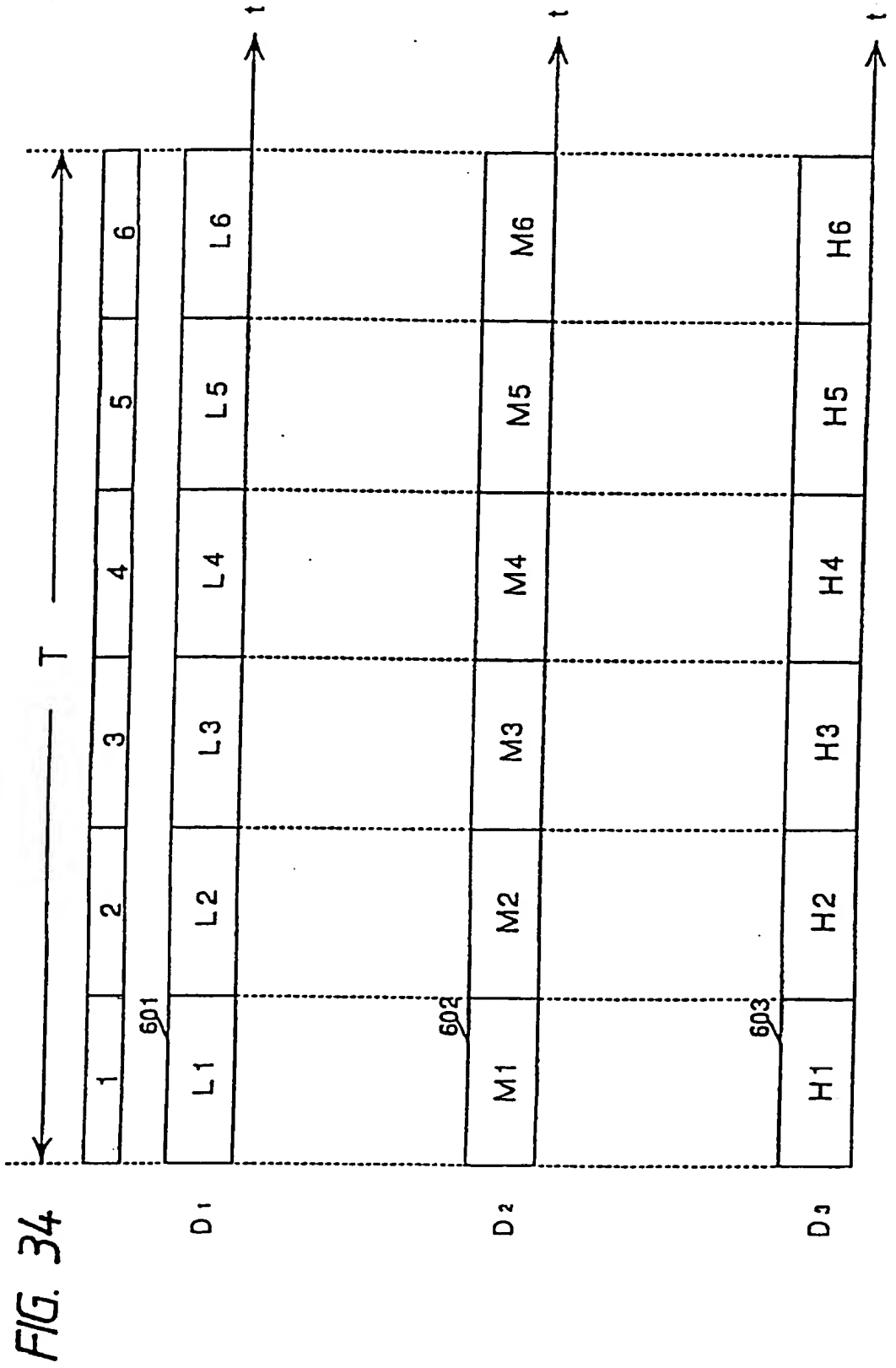

t
t
t
T
1
2
3
4
5
6
L1
L2
L3
L4
L5
L6
M1
M2
M3
M4
M5
M6
H1
H2
H3
H4
H5
H6
601
602
603
D1
D2
D3

FIG. 34

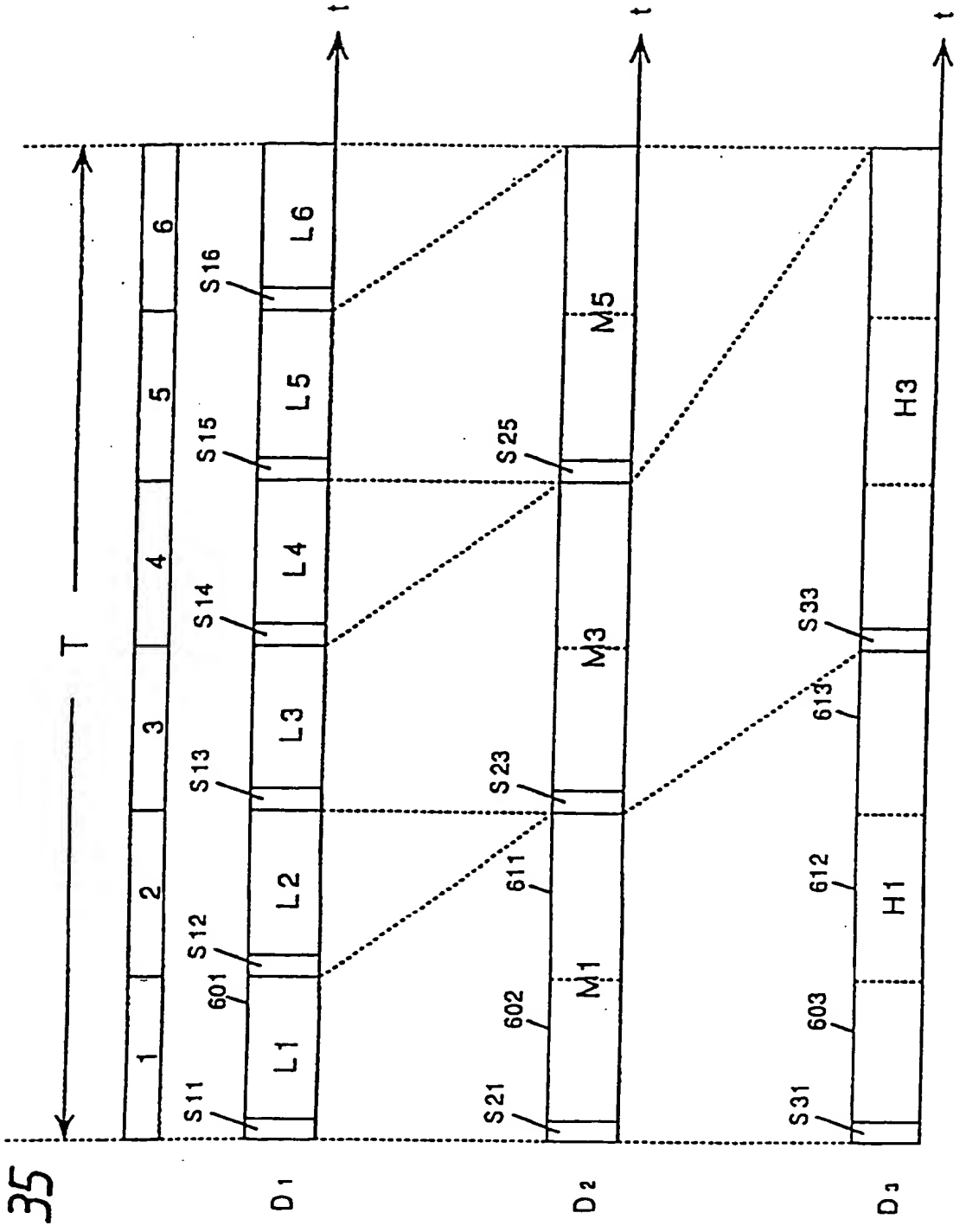

t
T
1
2
3
4
5
6
S11
S12
S13
S14
S15
S16
L1
L2
L3
L4
L5
L6
601
D1
S21
S23
S25
M1
M3
M5
602
611
D2
S31
S33
H1
H3
603
612
613
D3

FIG. 35

FIG. 36

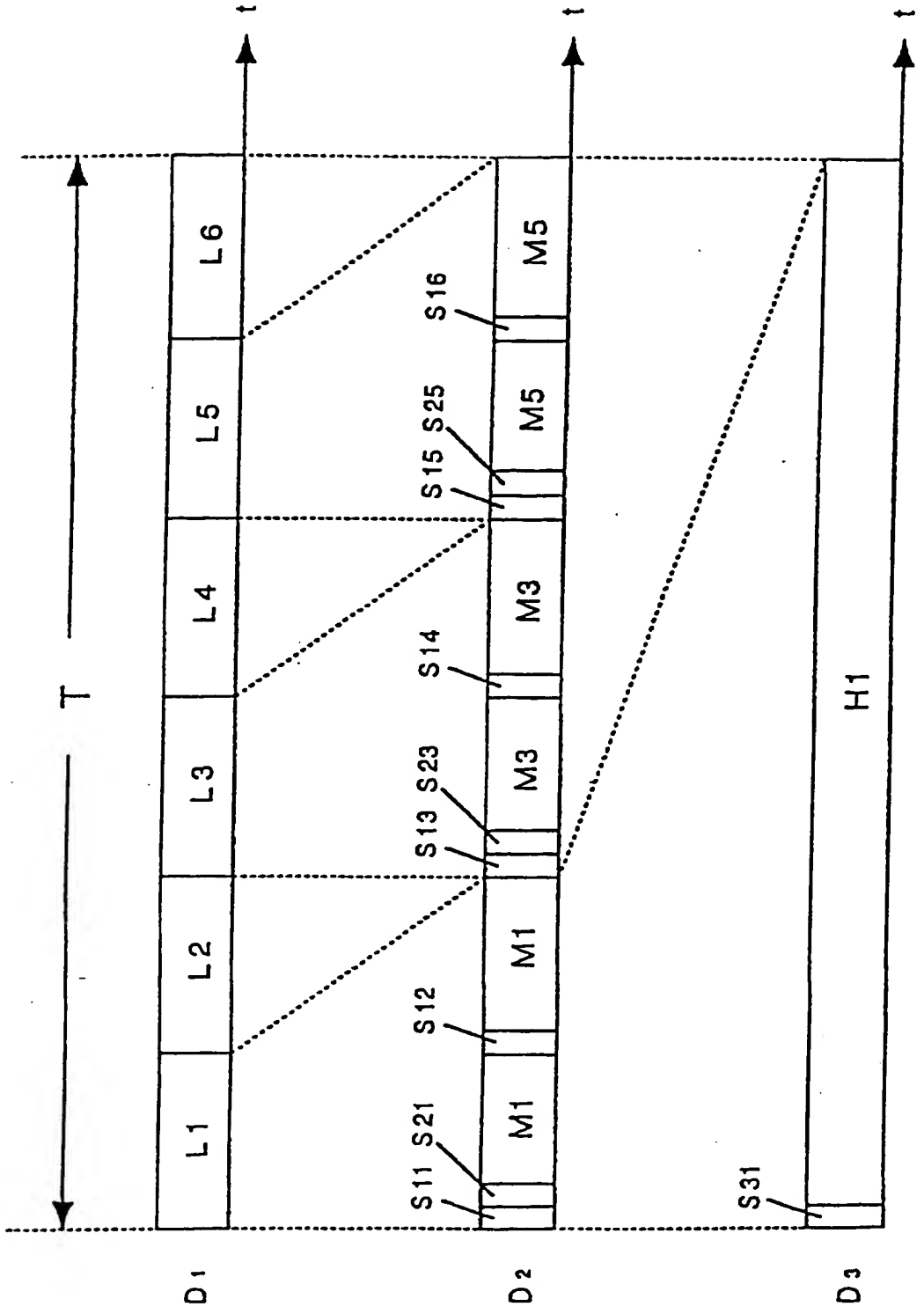
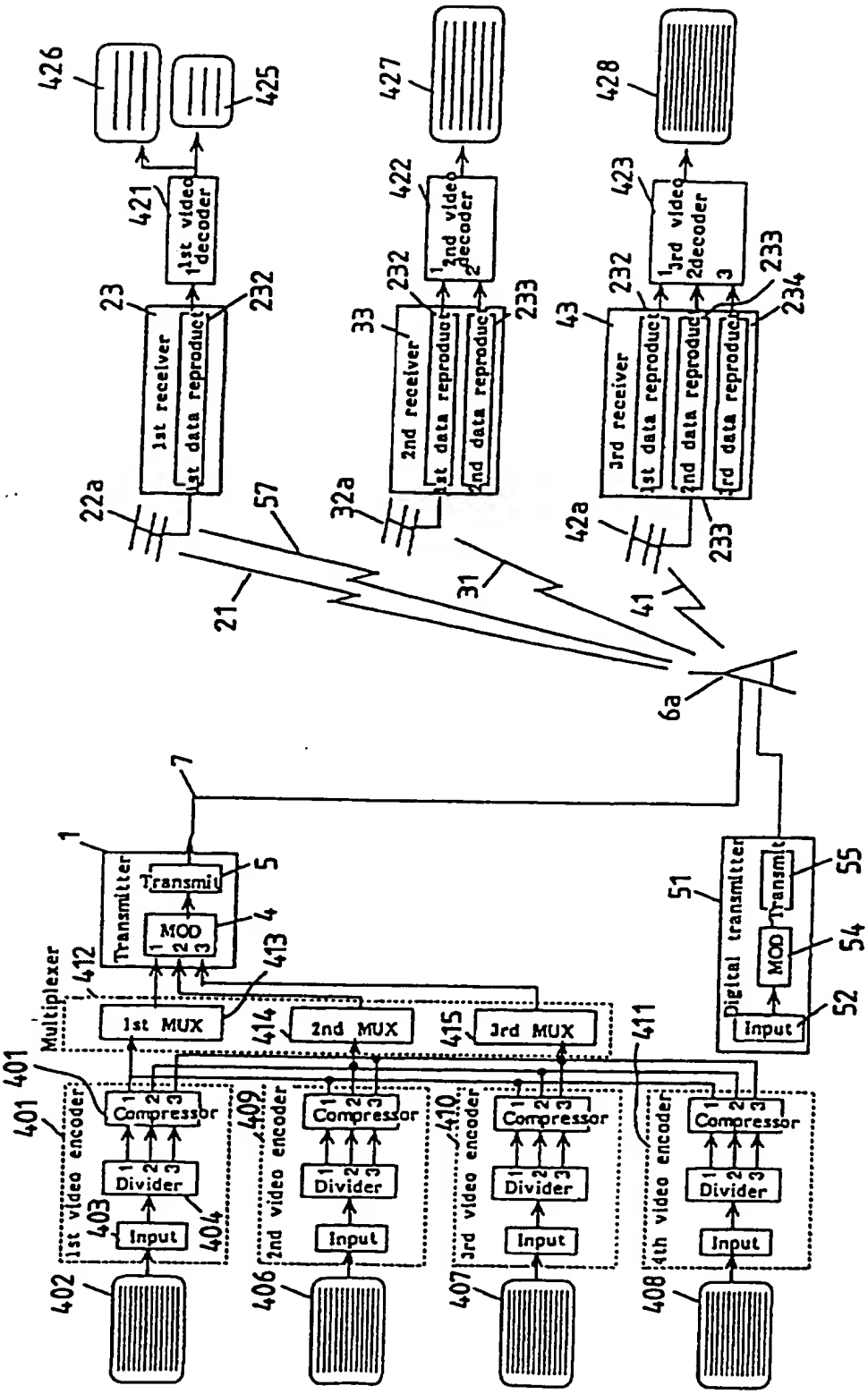
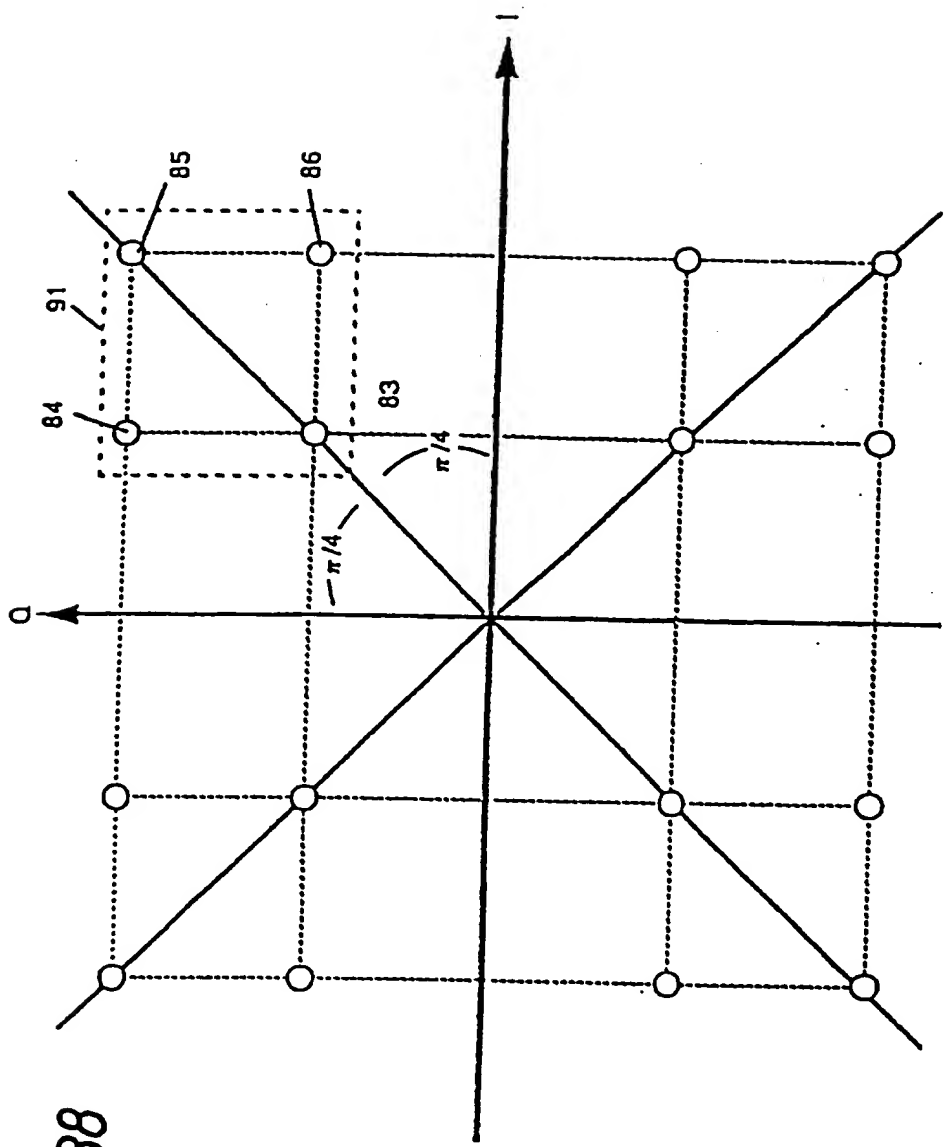

t
t
t
T
L6
L5
L4
L3
L2
L1
M5
M5
M3
M3
M1
M1
H1
S16
S25
S15
S14
S23
S13
S12
S21
S11
S31
D1
D2
D3

FIG. 37


426
425
427
428
421
1st video decoder
422
2nd video decoder
423
3rd video decoder
23
232
1st receiver
1st data reproduct
33
2nd receiver
2nd data reproduct
233
43
3rd receiver
3rd data reproduct
234
22a
32a
42a
57
31
41
21
6a
7
1
Transmitter
Transmit
5
MOD
4
412
413
Multiplexer
1st MUX
414
2nd MUX
415
3rd MUX
411
51
Digital transmitter
55
54
52
Input
401
1st video encoder
Compressor
Divider
403
404
409
2nd video encoder
410
3rd video encoder
4th video encoder
402
406
407
408



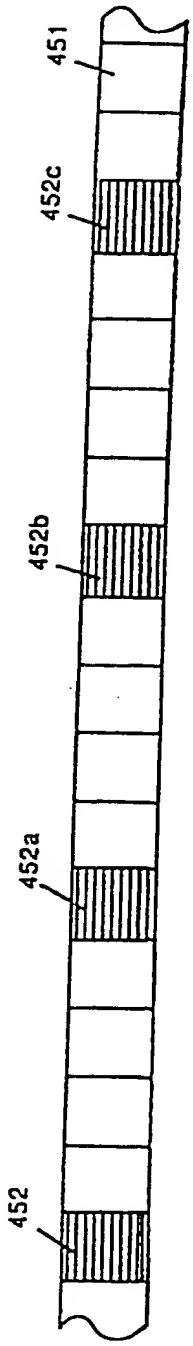


FIG. 38

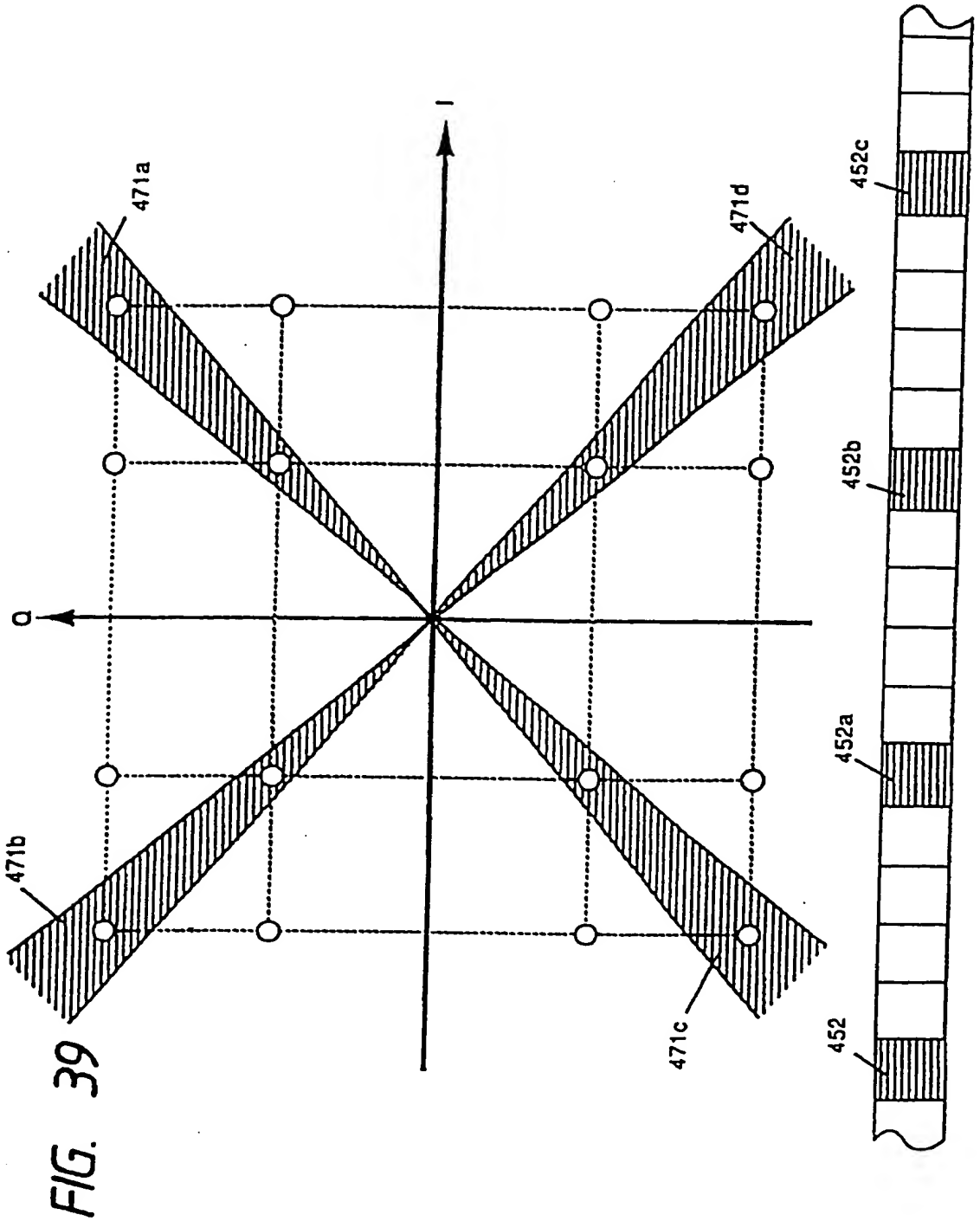


FIG. 39

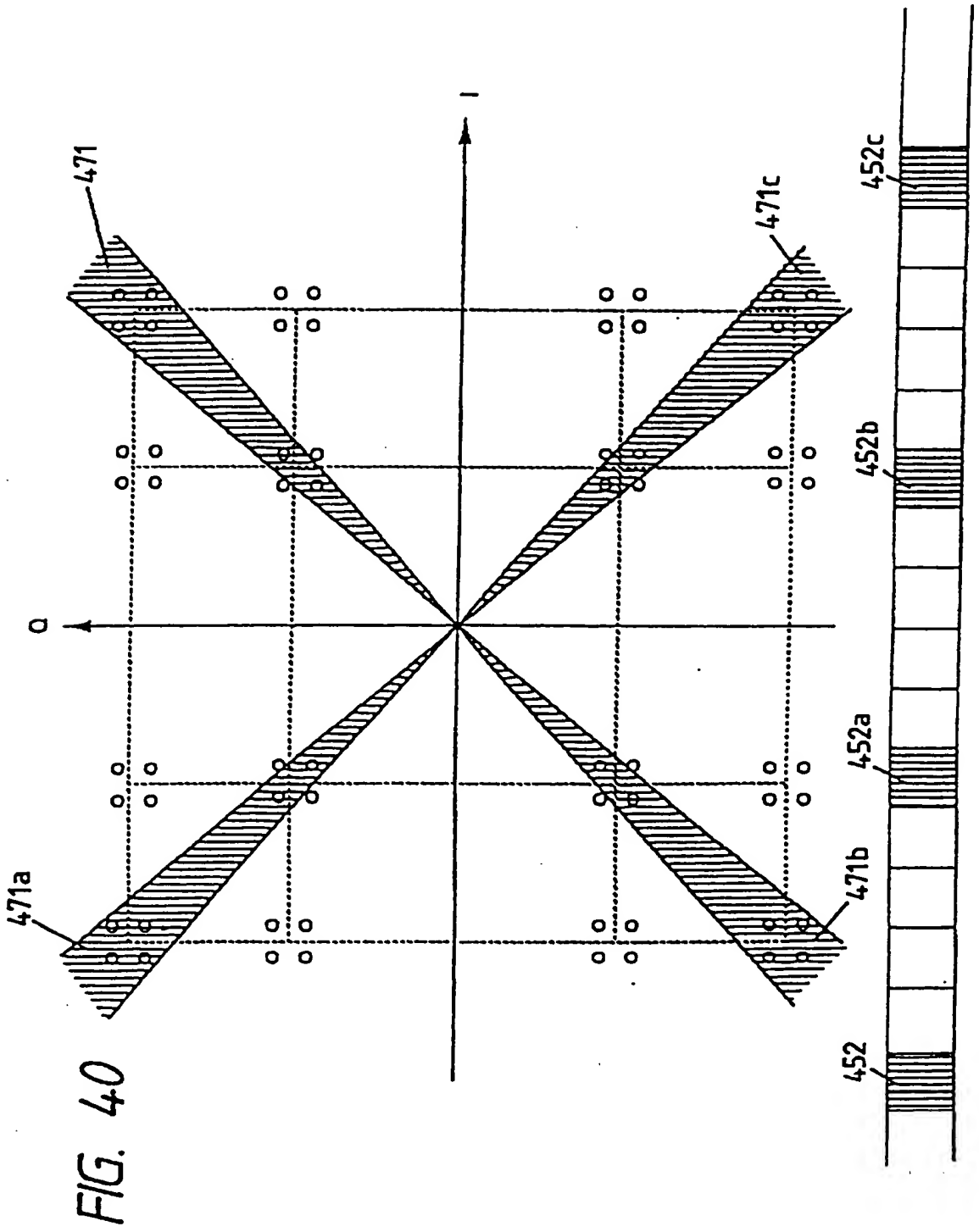
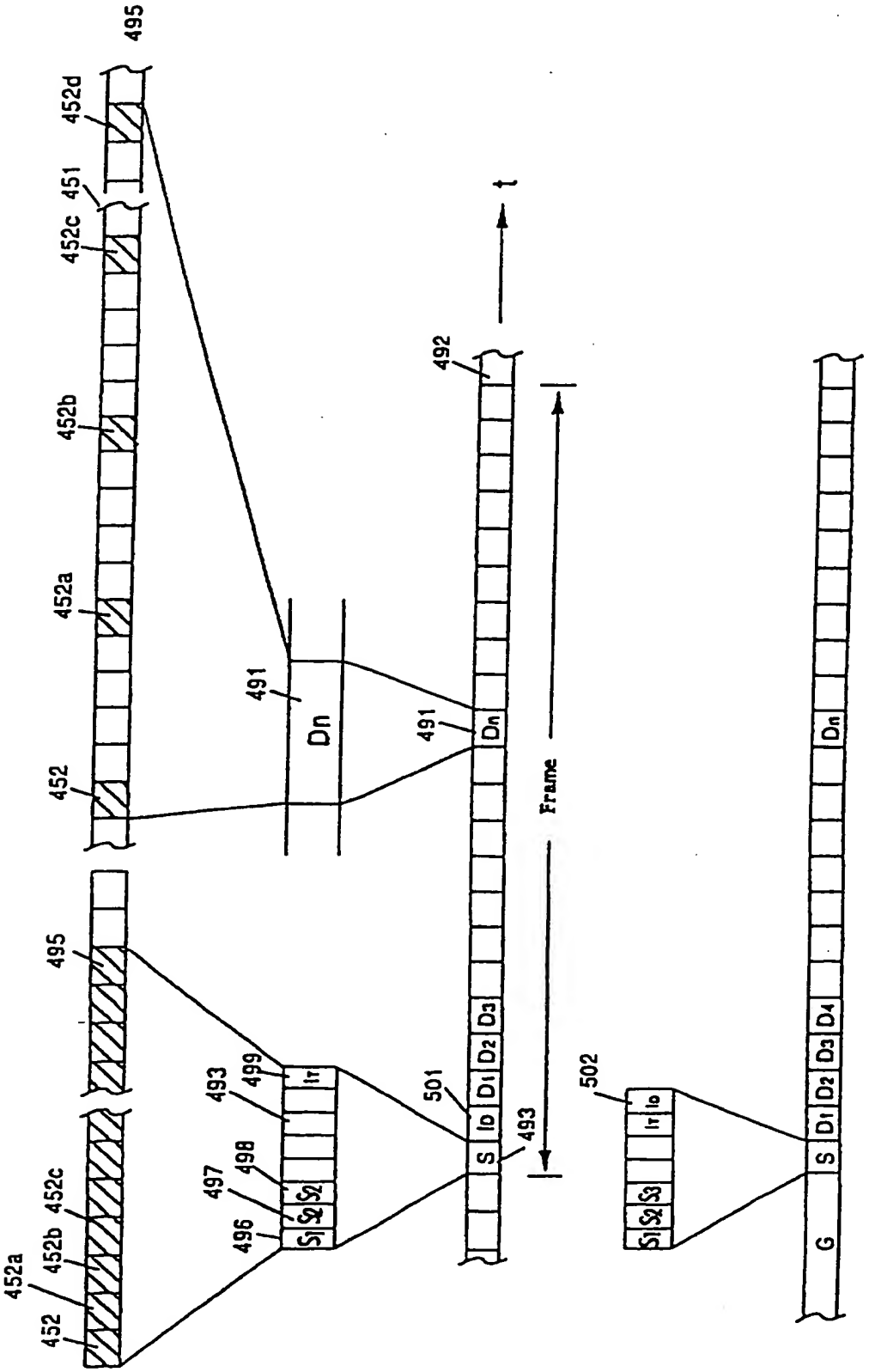


FIG. 40

FIG. 41


495
452d
451
452c
452b
452a
452
491
Dn
492
t
Frame
493
499
I1
497
498
S1
S2
496
501
I0
S
D1
D2
D3
502
D4
G

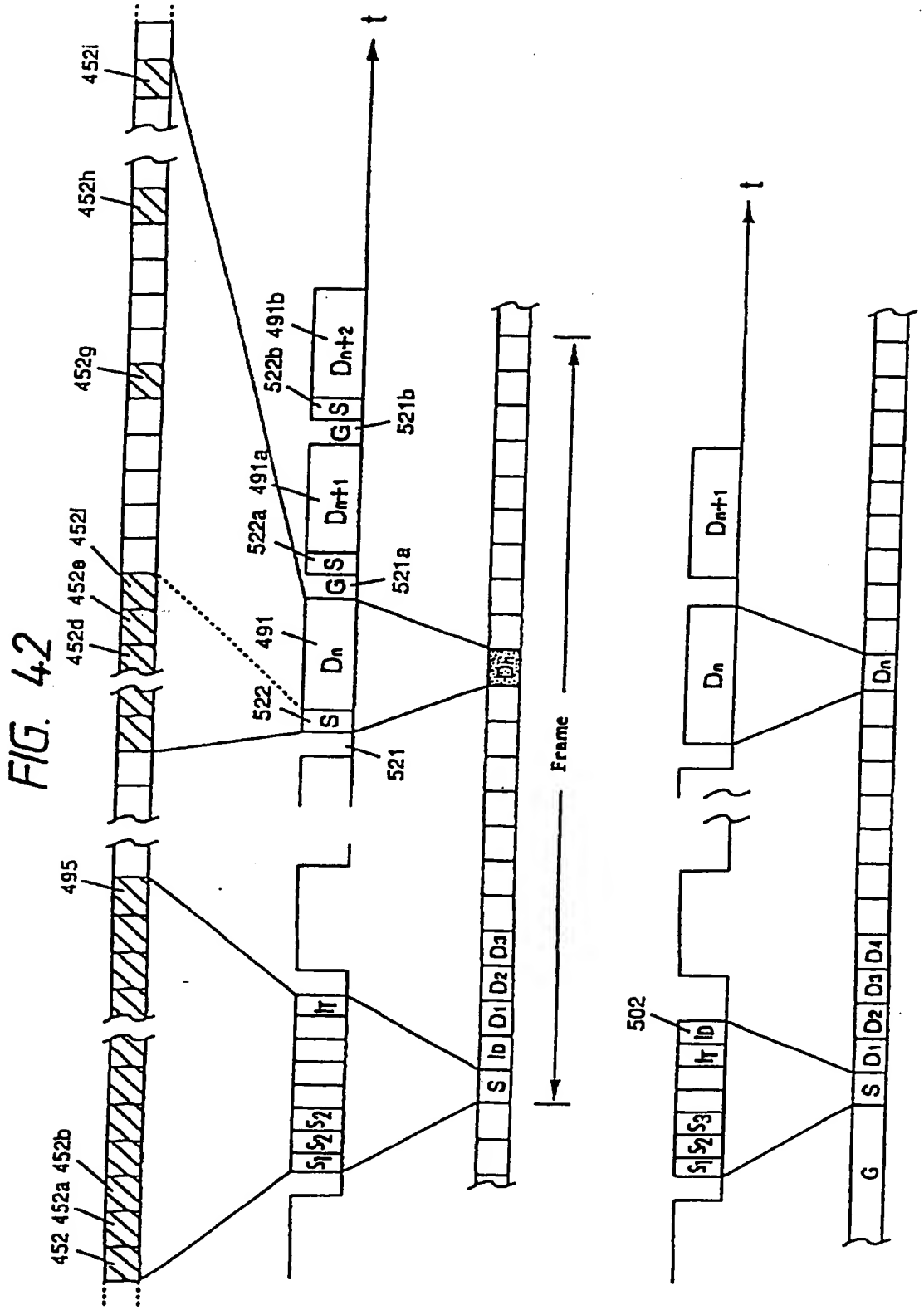
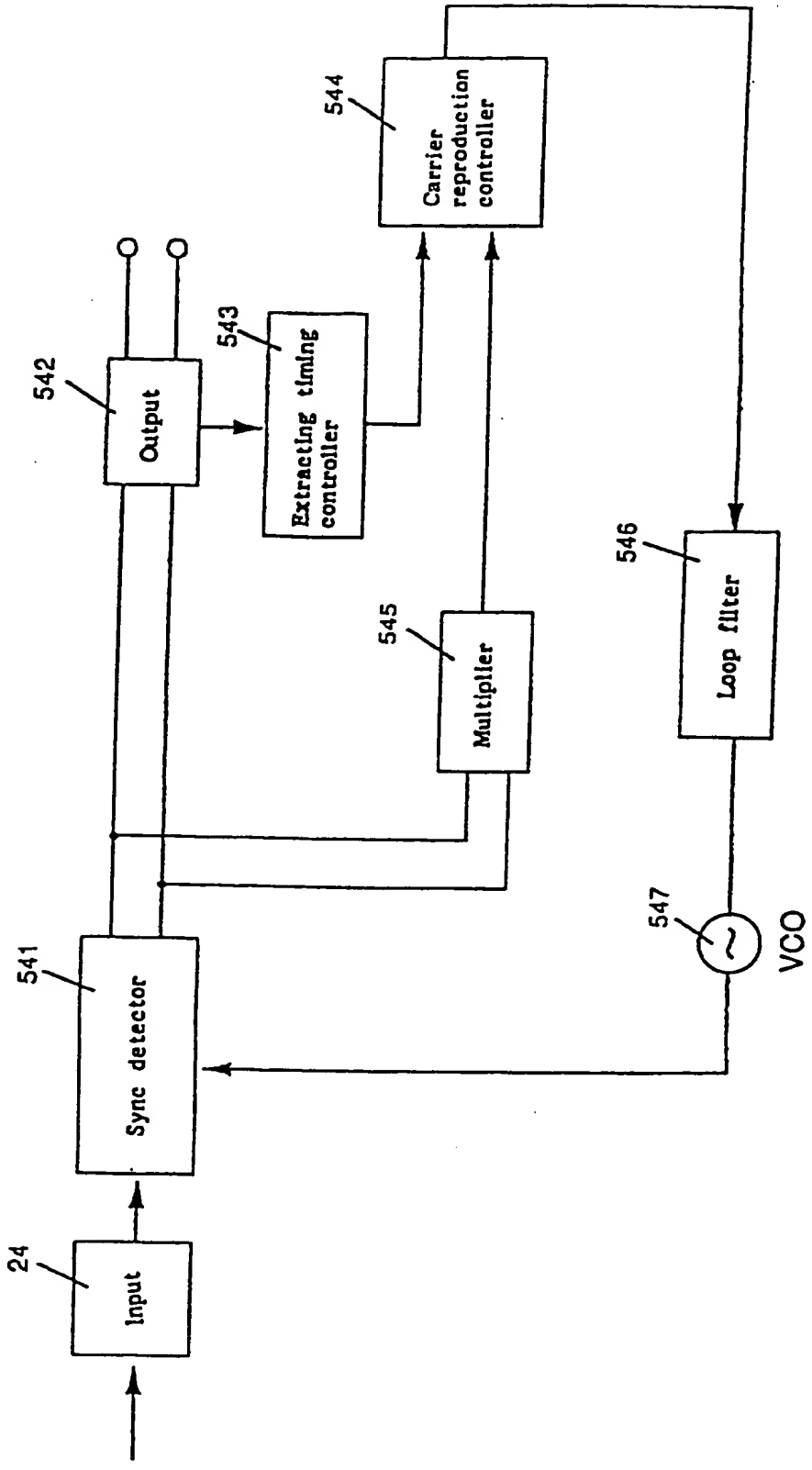

452l
452h
452g
452l
452e
452d
452
452a
452b
495
491
522
521
522a
491a
521a
522b
491b
521b
Dn
Dn+1
Dn+2
S
G
Frame
t
502
D1
D2
D3
D4

FIG. 42

FIG. 43


544
Carrier reproduction controller
543
Extracting timing controller
542
Output
546
Loop filter
545
Multiplier
547
VCO
541
Sync detector
24
Input

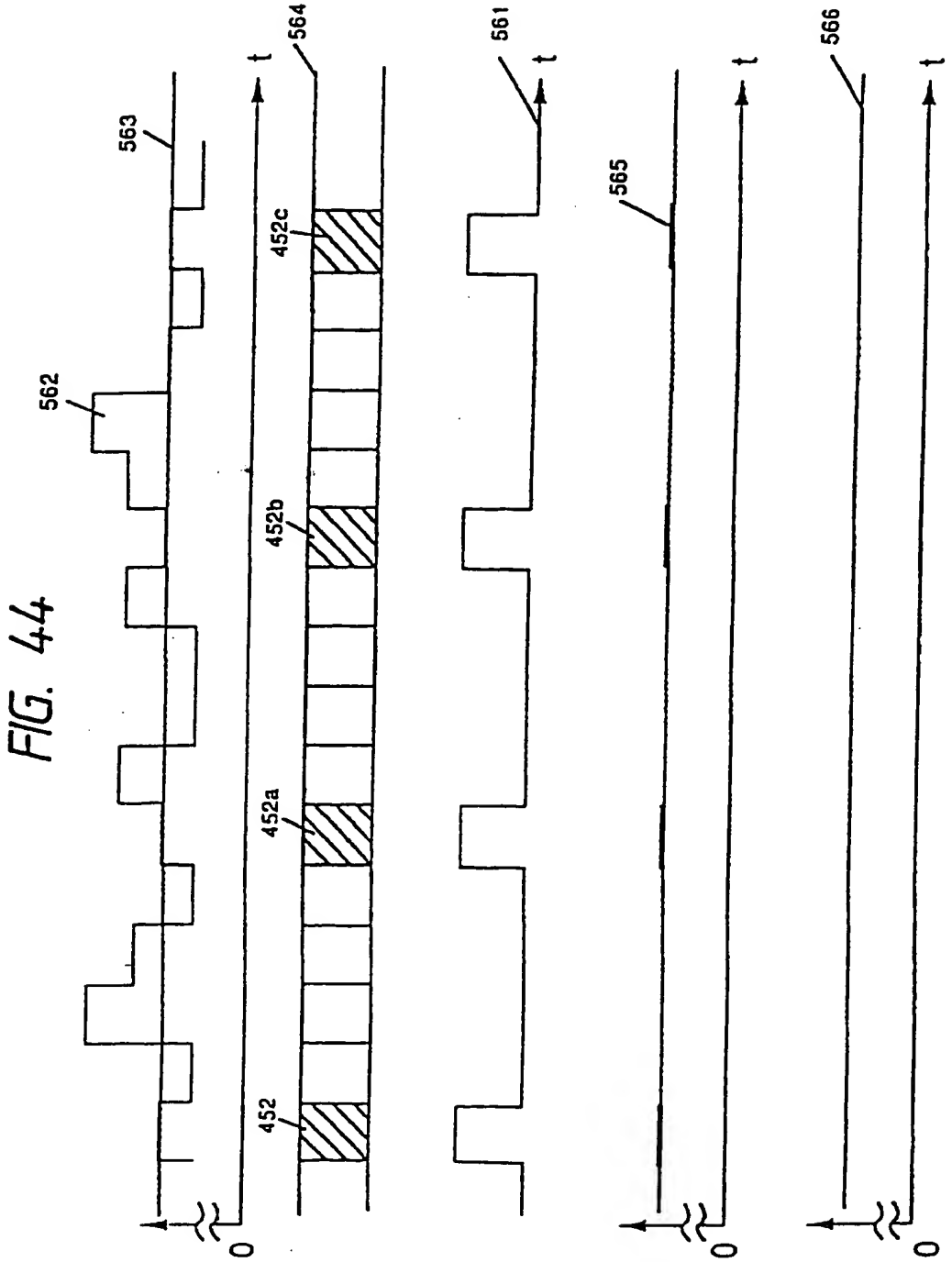


FIG. 44

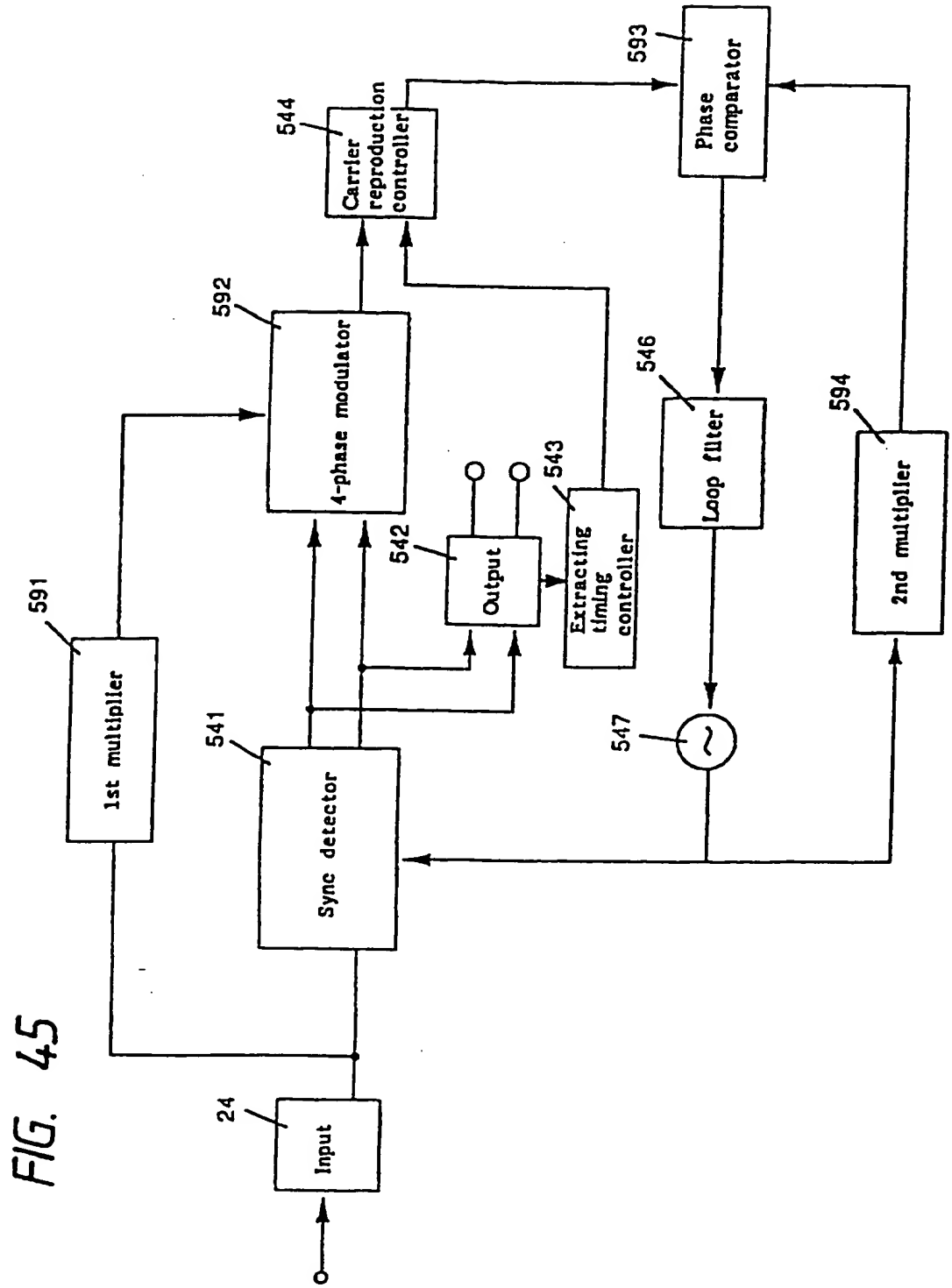

593
Phase comparator
544
Carrier reproduction controller
592
4-phase modulator
546
Loop filter
594
2nd multiplier
543
542
Output
Extracting timing controller
591
1st multiplier
541
Sync detector
547
24
Input

FIG. 45

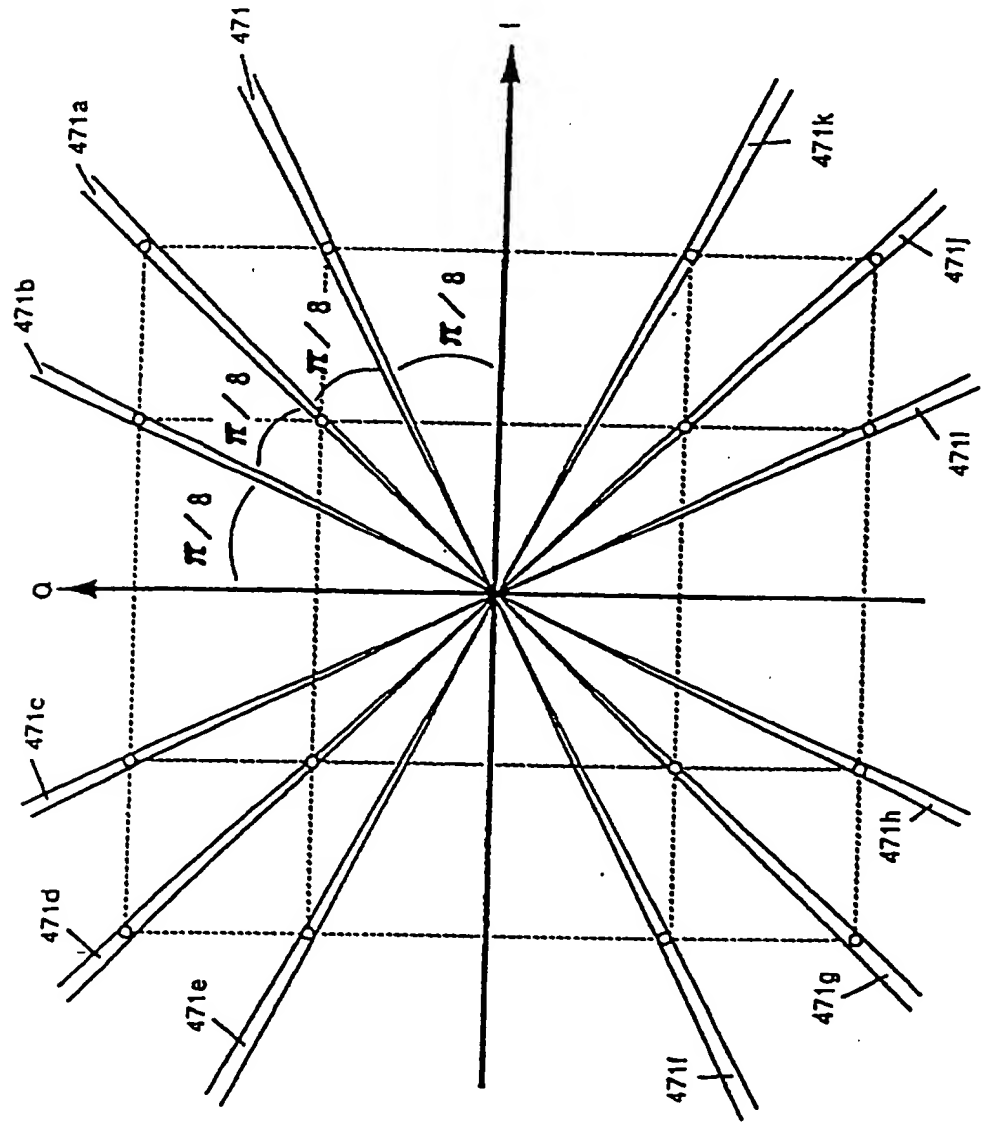

I
Q
471
471a
471b
471c
471d
471e
471f
471g
471h
471i
471j
471k
471l
π/8
π/8
π/8
π/8

FIG. 46

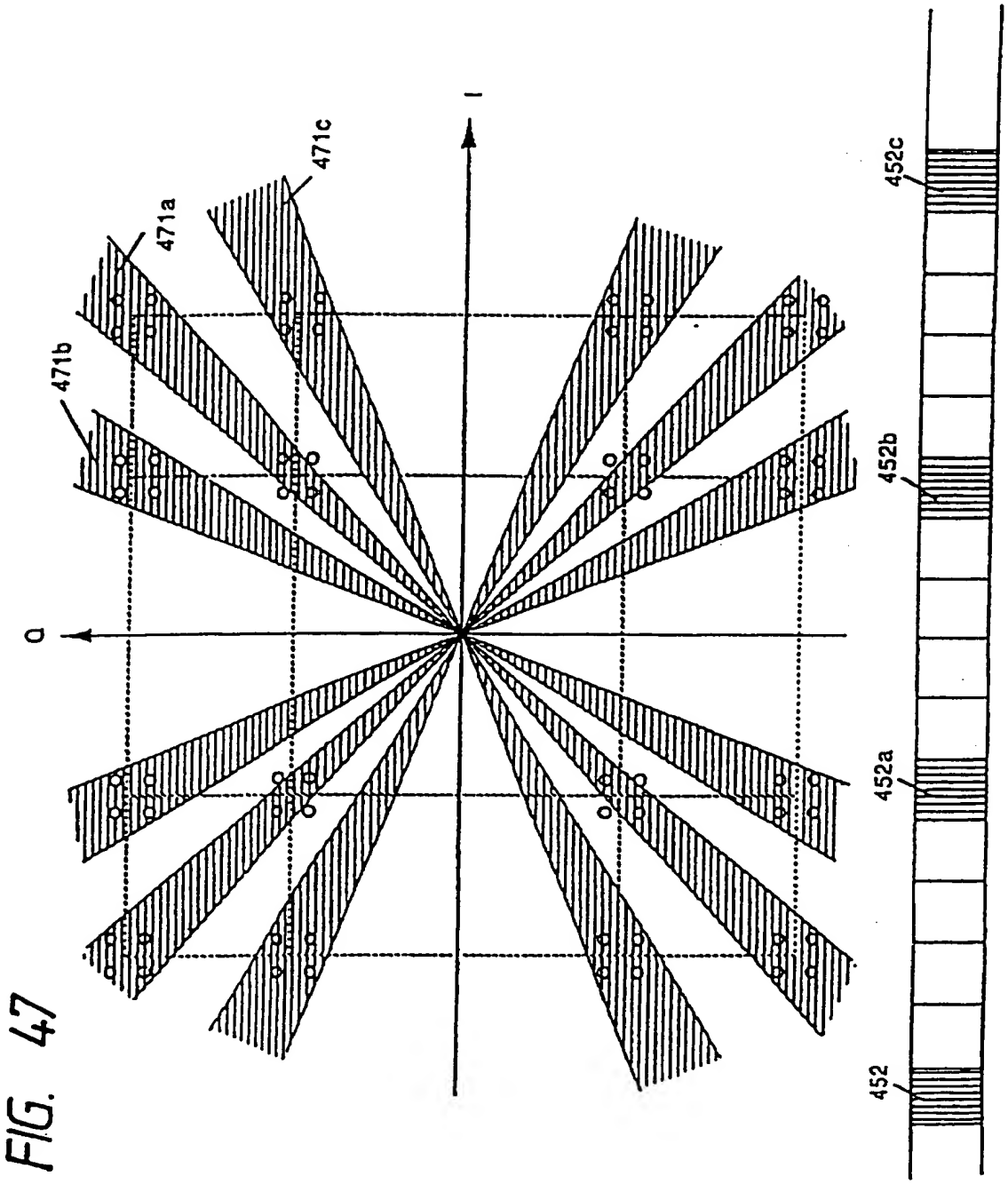


FIG. 47

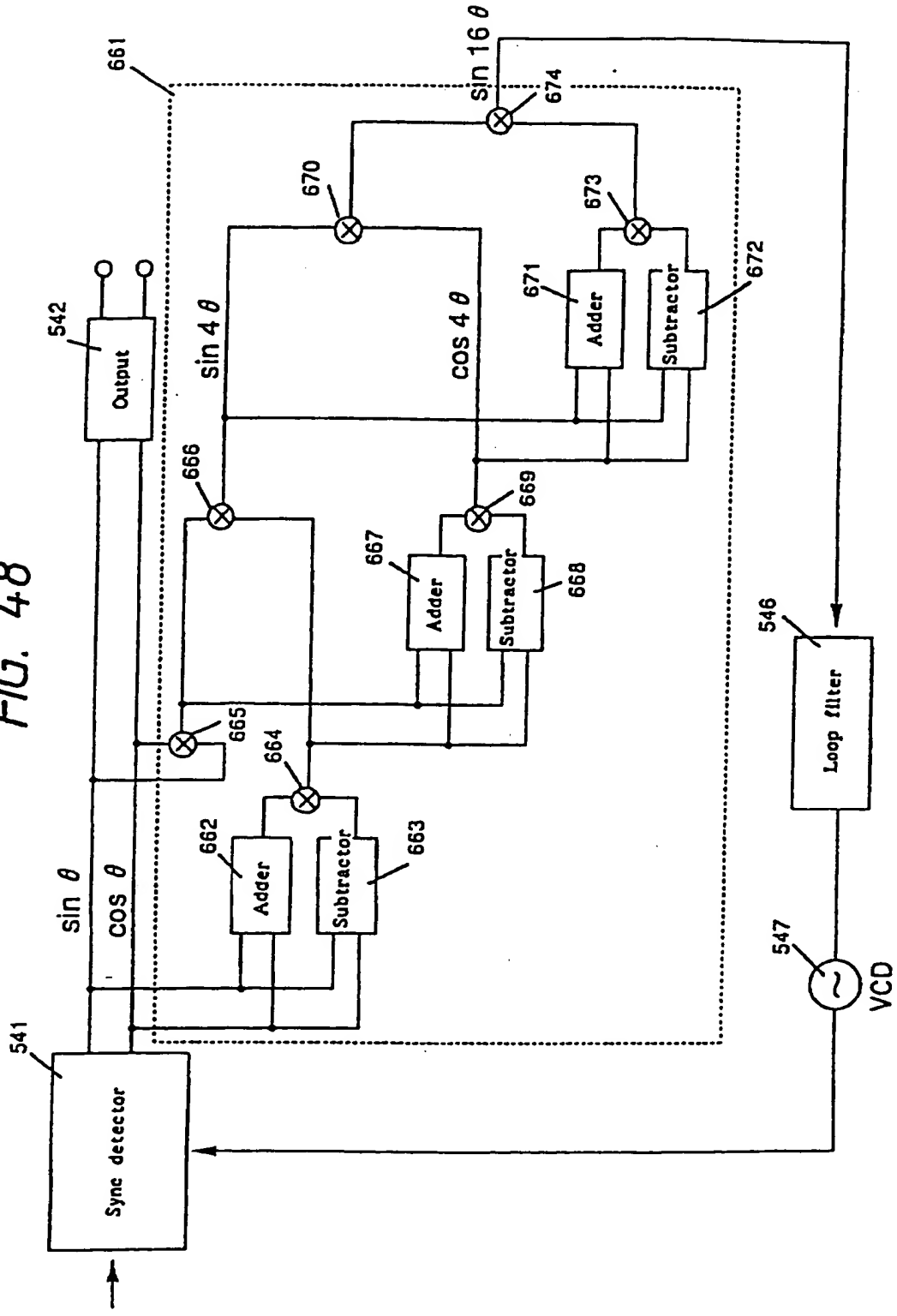

661
sin 16 θ
674
670
673
671
Adder
672
Subtractor
542
Output
sin 4 θ
cos 4 θ
666
669
667
Adder
668
Subtractor
546
Loop filter
665
664
662
Adder
663
Subtractor
sin θ
cos θ
547
VCD
541
Sync detector

FIG. 48

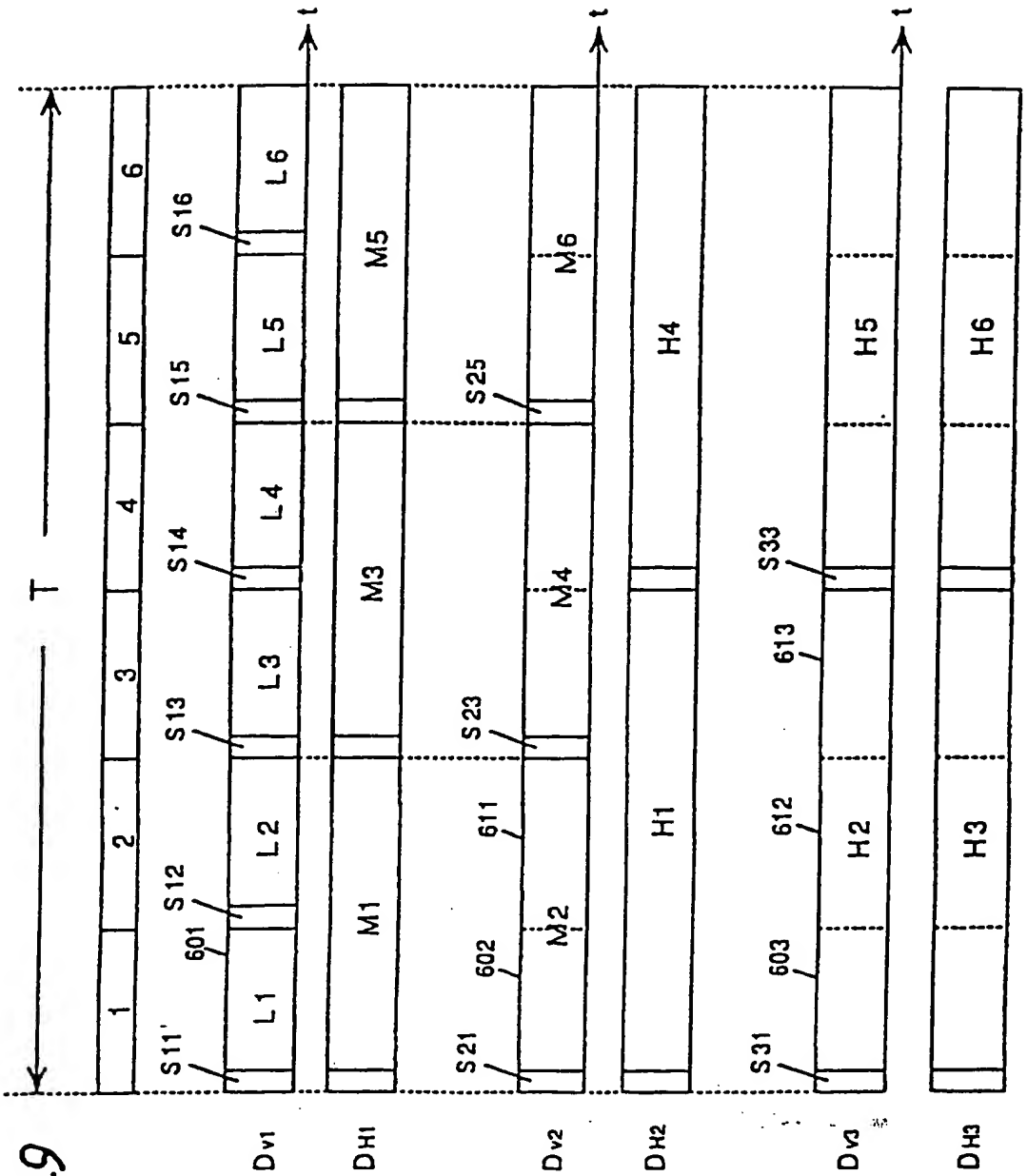

T
t
1
2
3
4
5
6
S11'
S12
S13
S14
S15
S16
601
L1
L2
L3
L4
L5
L6
M1
M2
M3
M4
M5
M6
H1
H2
H3
H4
H5
H6
S21
S23
S25
611
602
S31
S33
613
612
603
DV1
DH1
DV2
DH2
DV3
DH3

FIG. 49

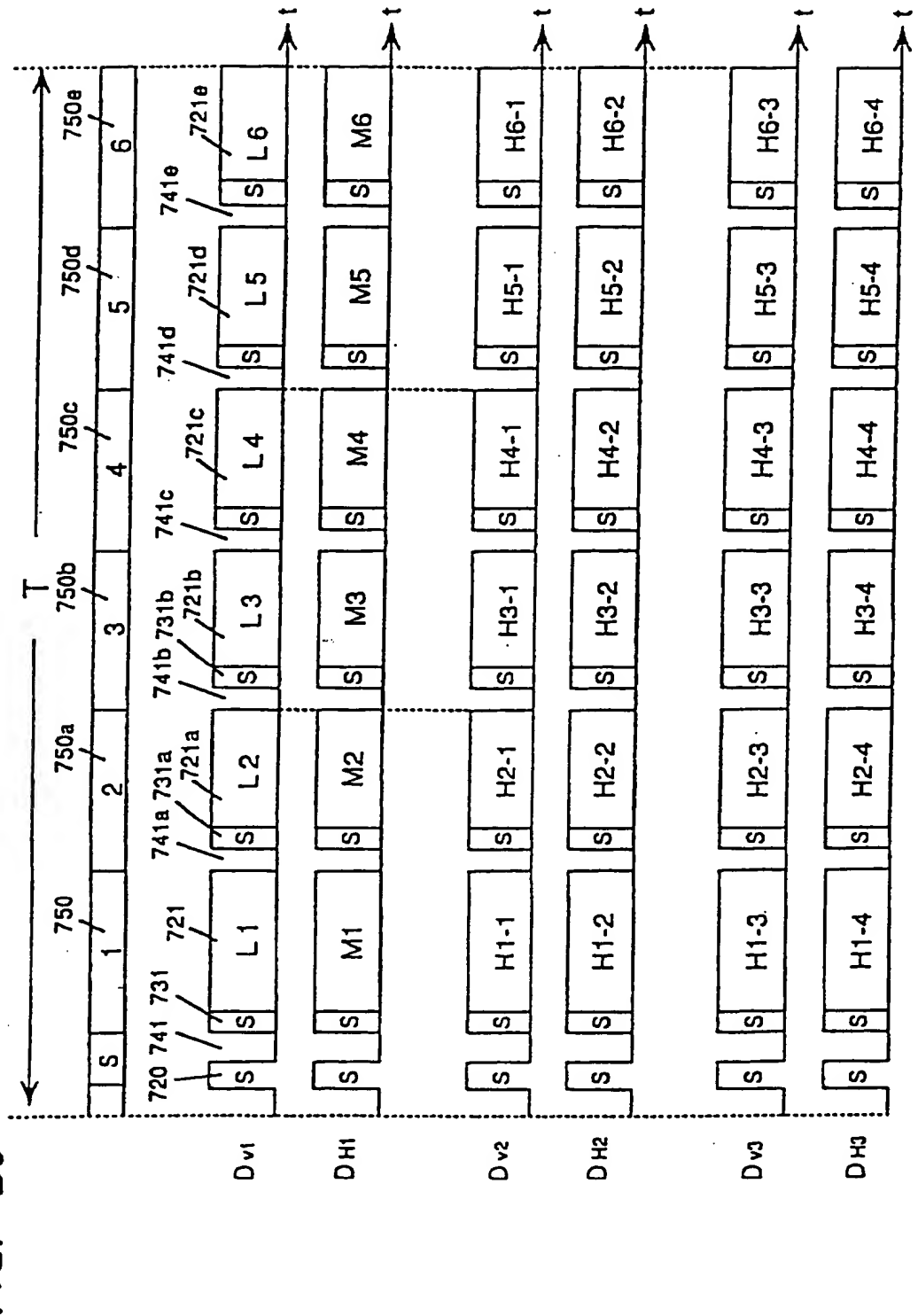

T
750
750a
750b
750c
750d
750e
1
2
3
4
5
6
720
741
731
721
741a
731a
721a
741b
731b
721b
741c
721c
741d
721d
741e
721e
S
L1
L2
L3
L4
L5
L6
M1
M2
M3
M4
M5
M6
H1-1
H1-2
H1-3
H1-4
H2-1
H2-2
H2-3
H2-4
H3-1
H3-2
H3-3
H3-4
H4-1
H4-2
H4-3
H4-4
H5-1
H5-2
H5-3
H5-4
H6-1
H6-2
H6-3
H6-4
t
DV1
DH1
DV2
DH2
DV3
DH3

FIG. 50

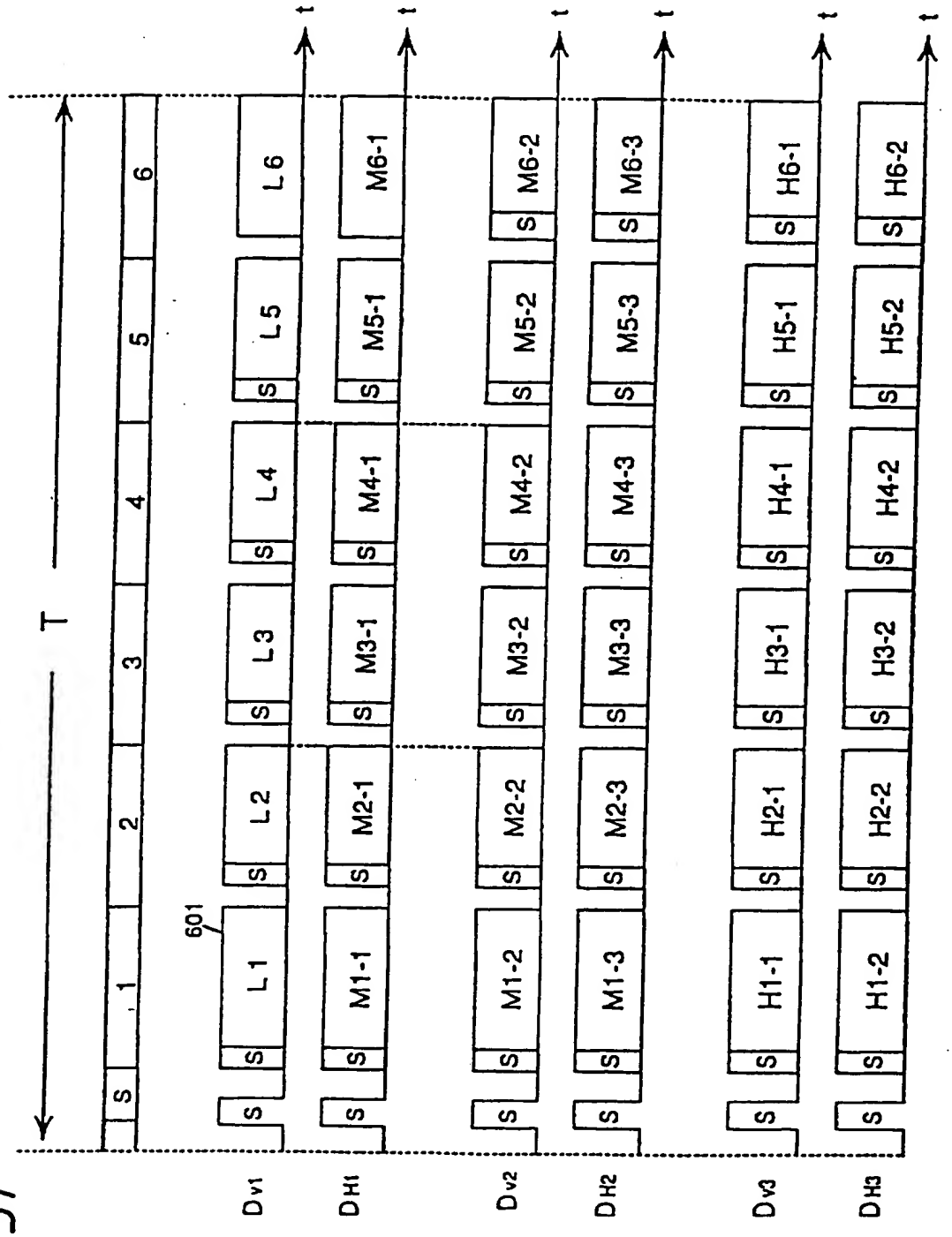

T
t
S
1
2
3
4
5
6
601
L1
L2
L3
L4
L5
L6
M1-1
M2-1
M3-1
M4-1
M5-1
M6-1
M1-2
M2-2
M3-2
M4-2
M5-2
M6-2
M1-3
M2-3
M3-3
M4-3
M5-3
M6-3
H1-1
H2-1
H3-1
H4-1
H5-1
H6-1
H1-2
H2-2
H3-2
H4-2
H5-2
H6-2
DV1
DH1
DV2
DH2
DV3
DH3

FIG. 51

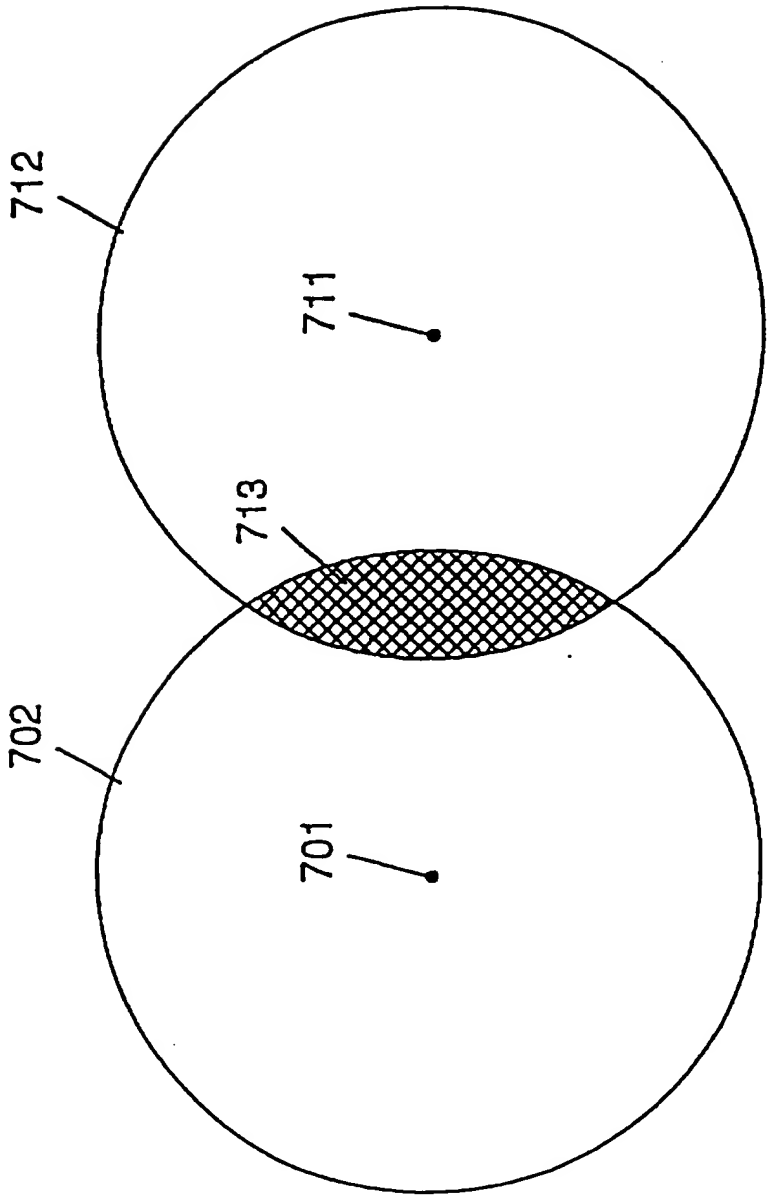


FIG. 52

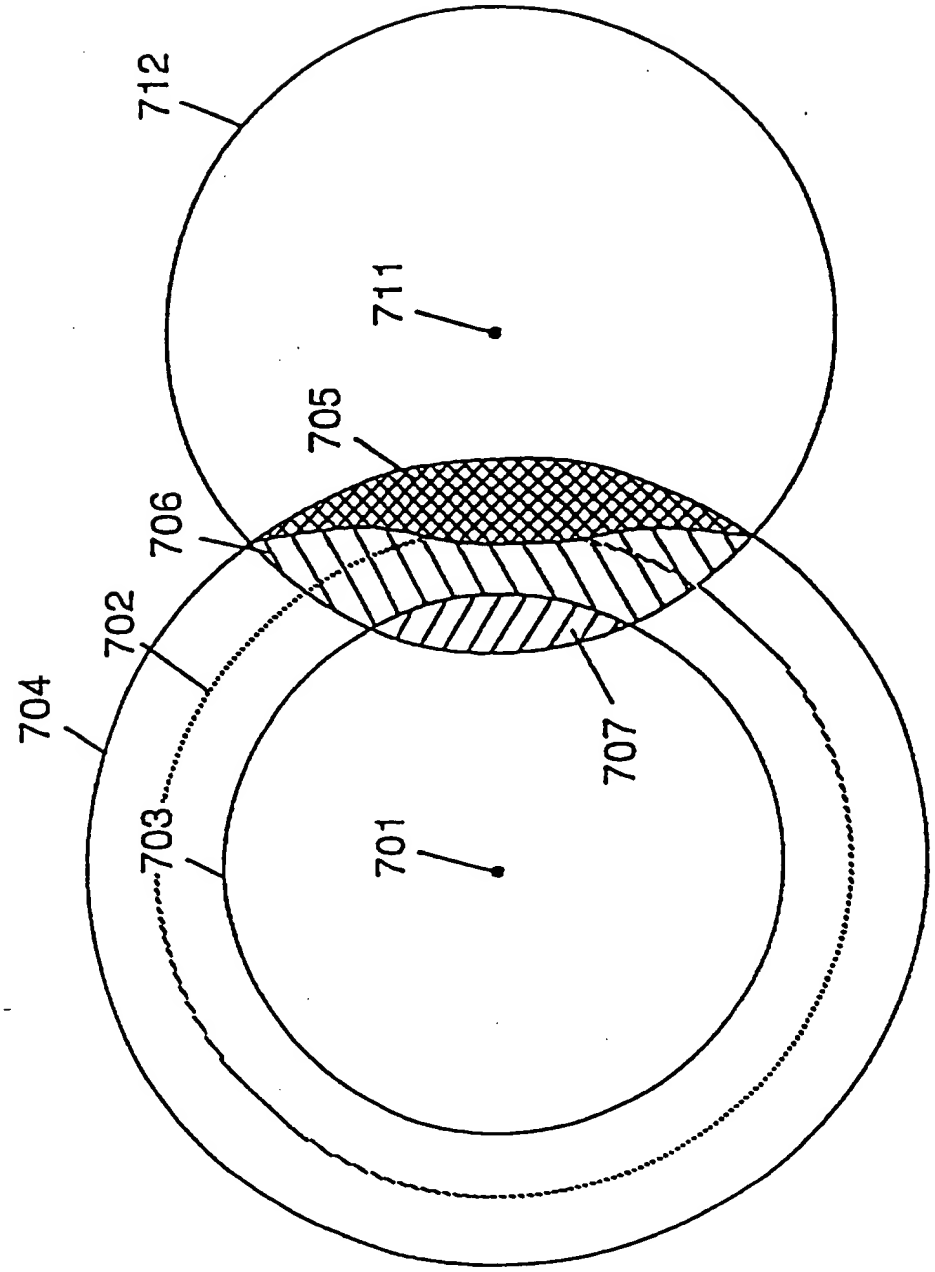


FIG. 53

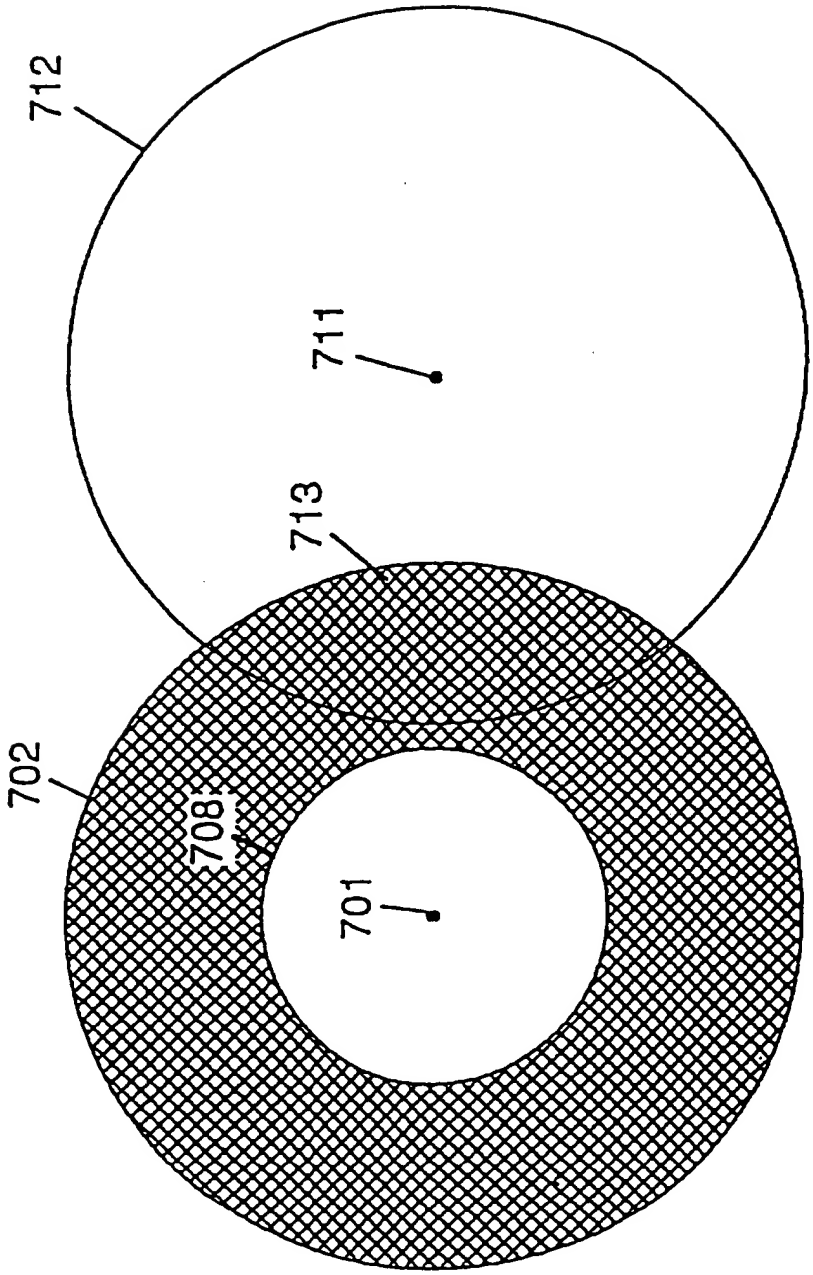
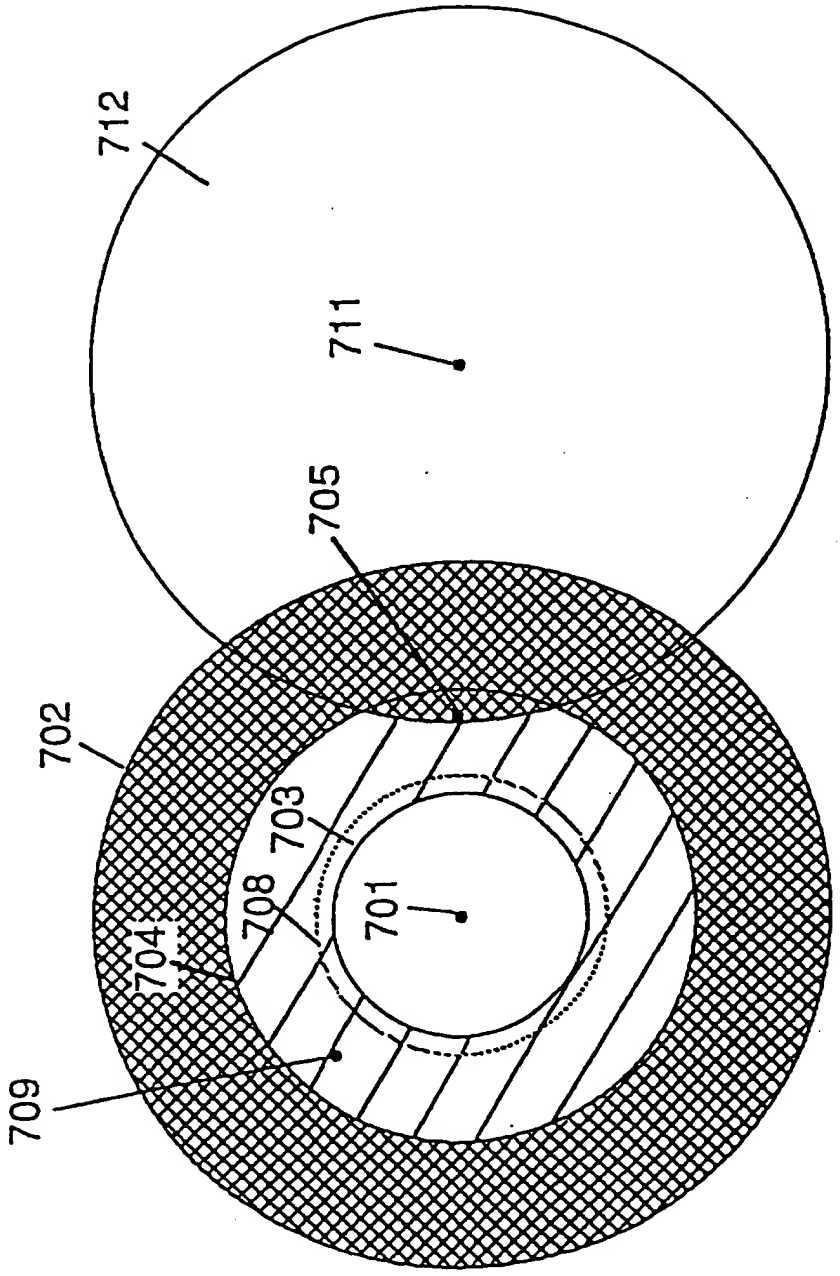


FIG. 54

FIG. 55



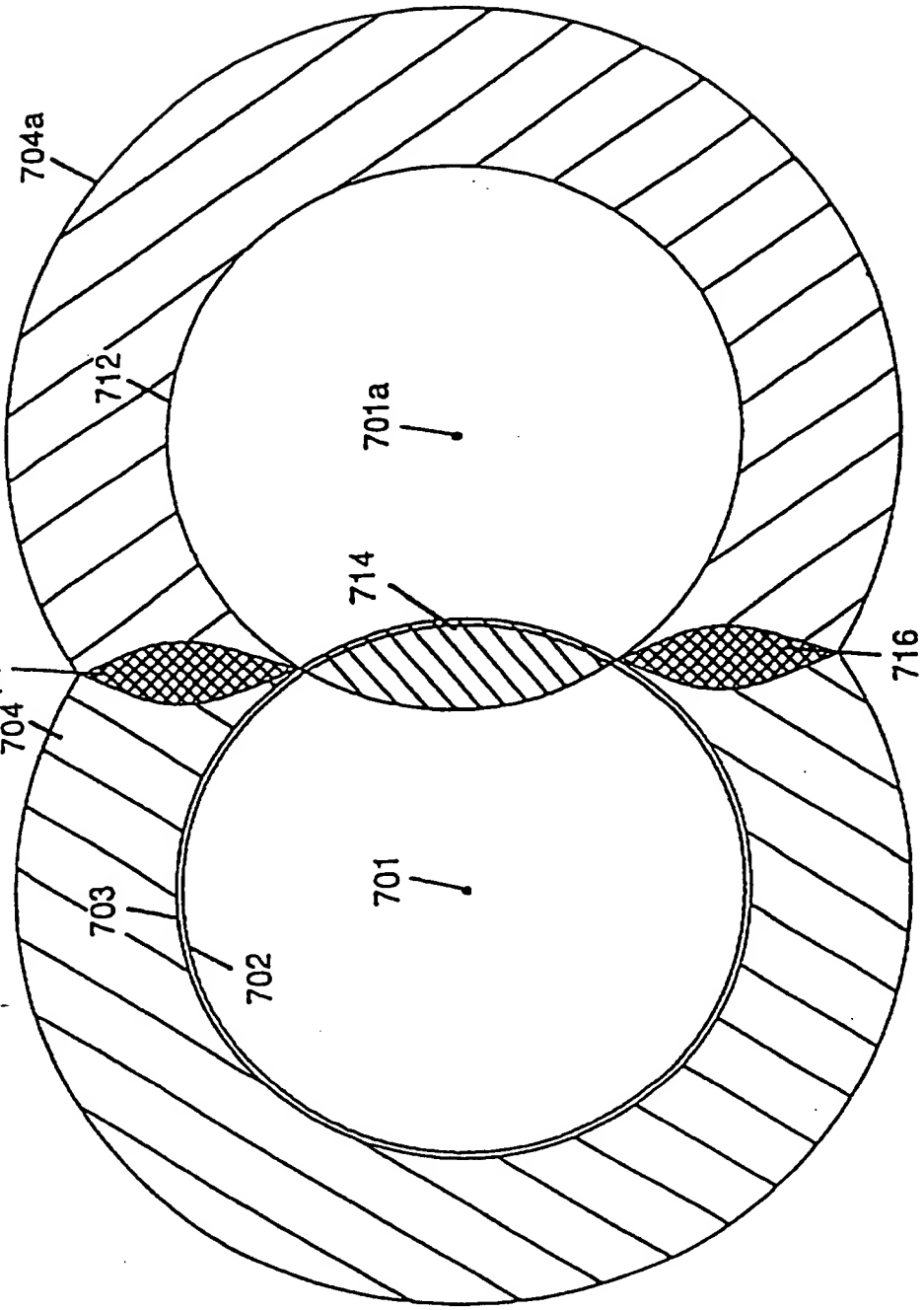


FIG. 56

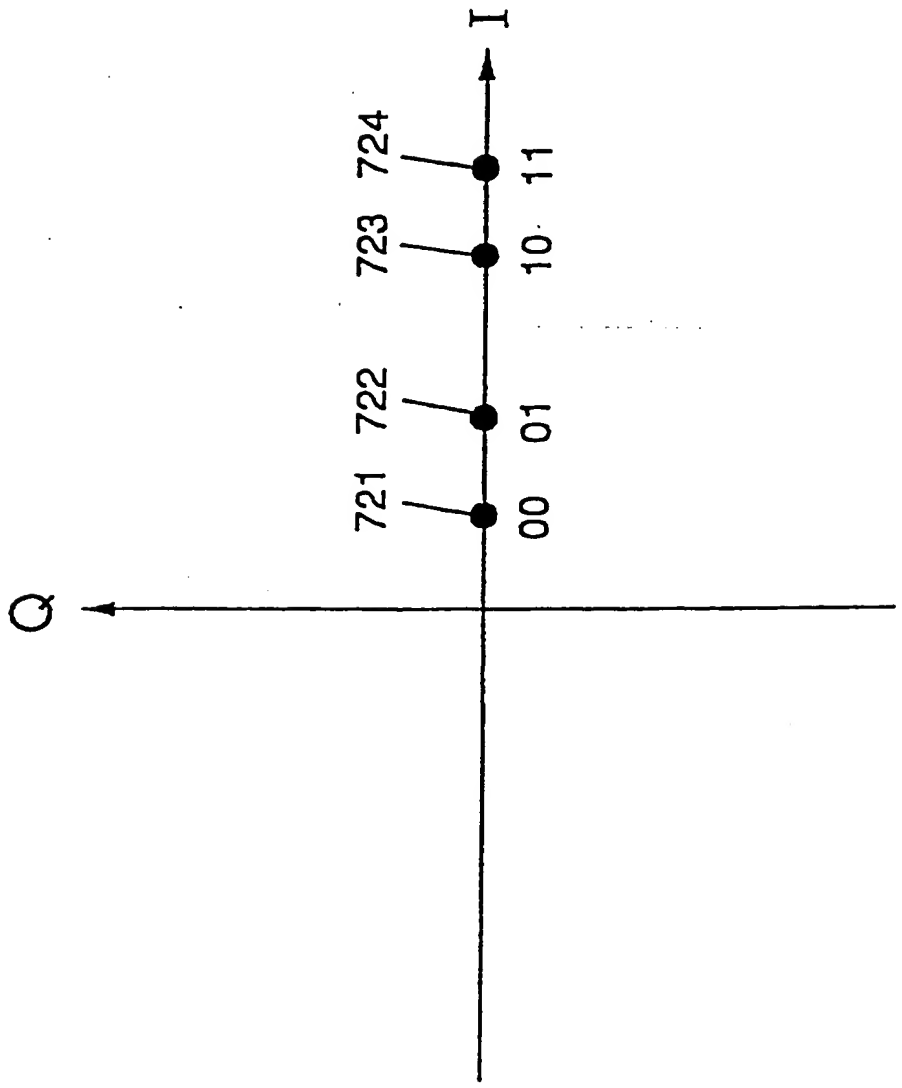


FIG. 57

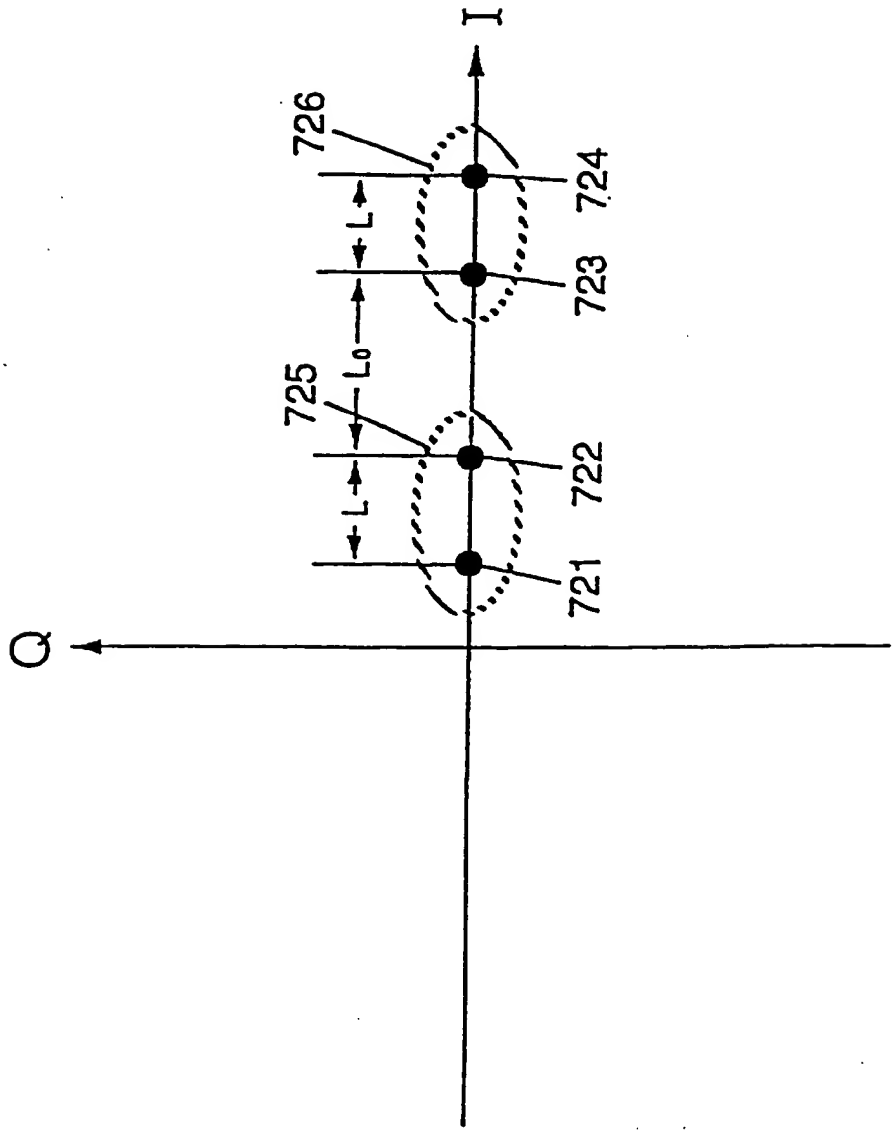


FIG. 58

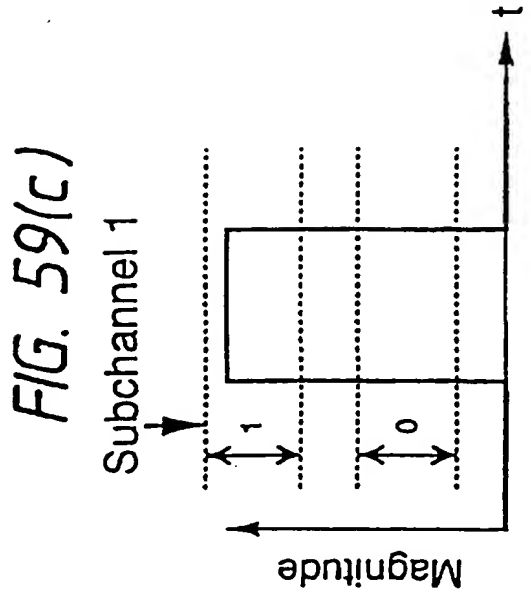


FIG. 59(c)

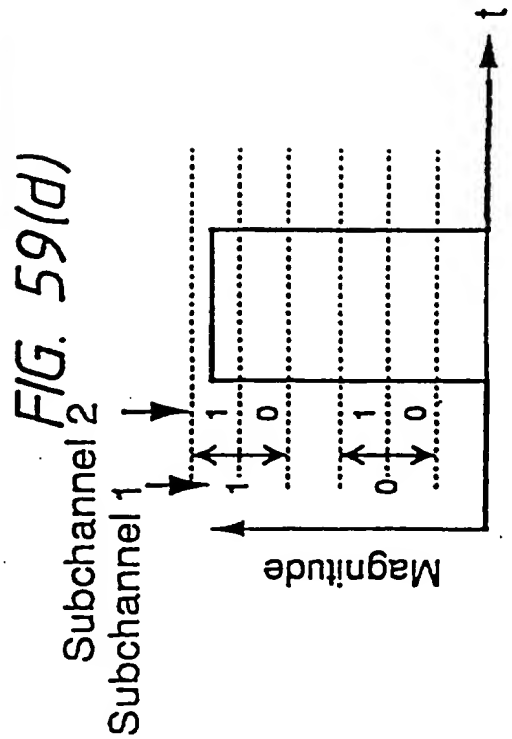


FIG. 59(d)

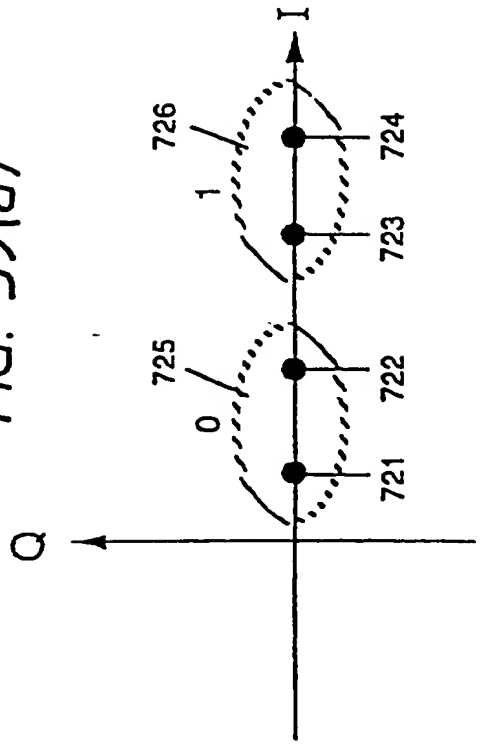


FIG. 59(a)

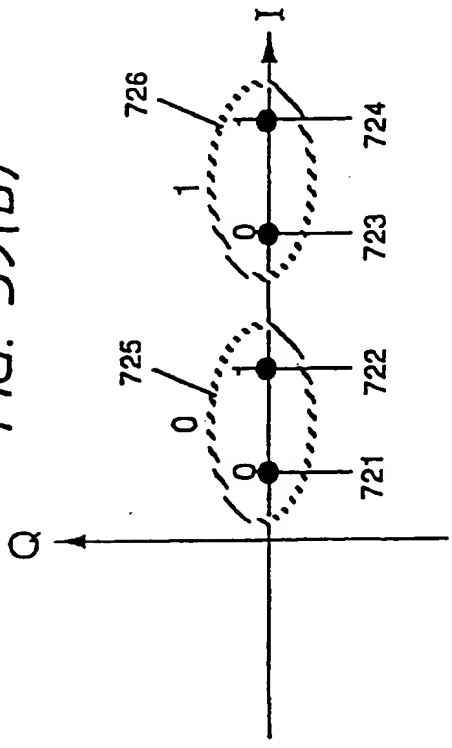


FIG. 59(b)

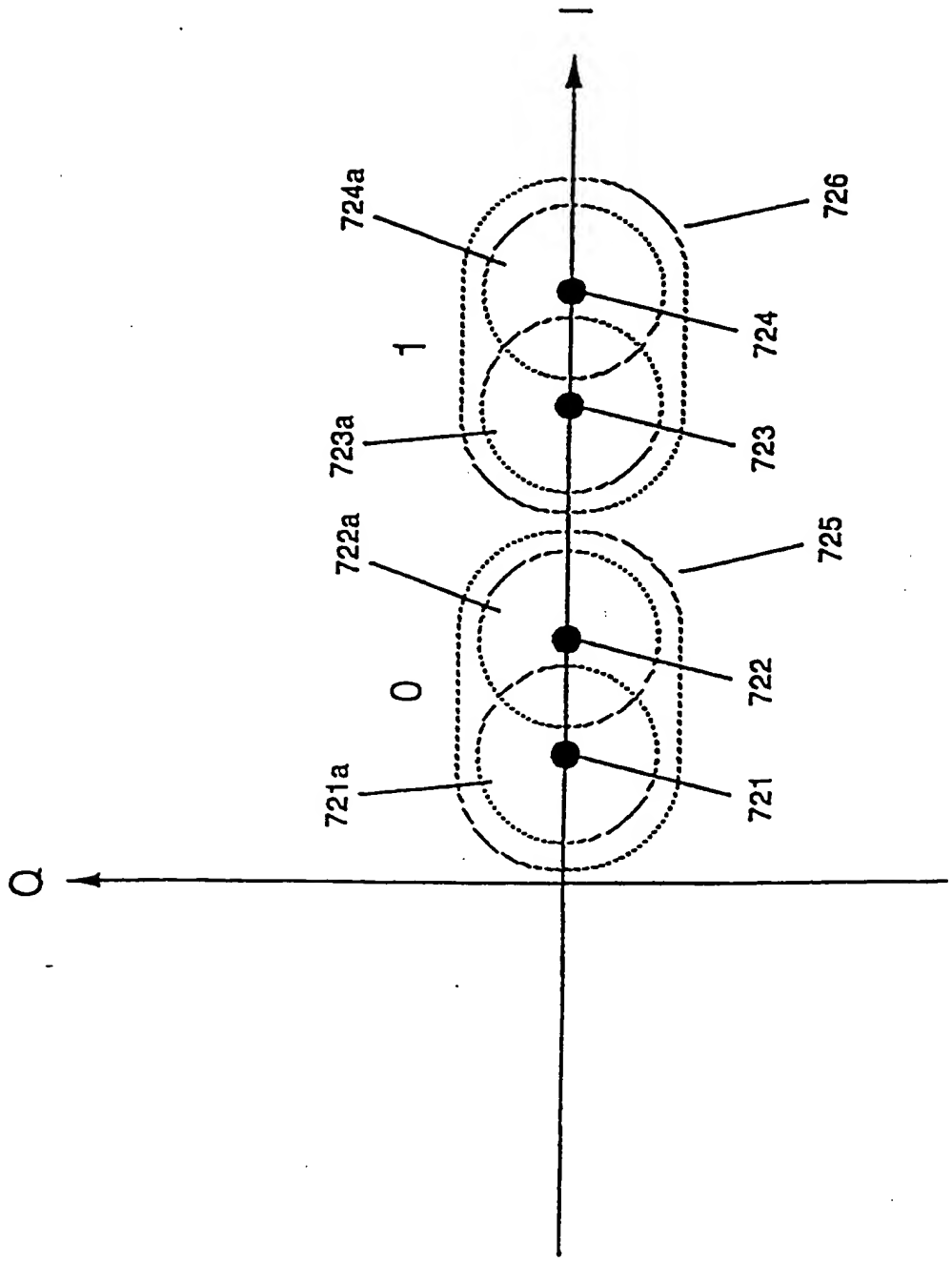


FIG. 60

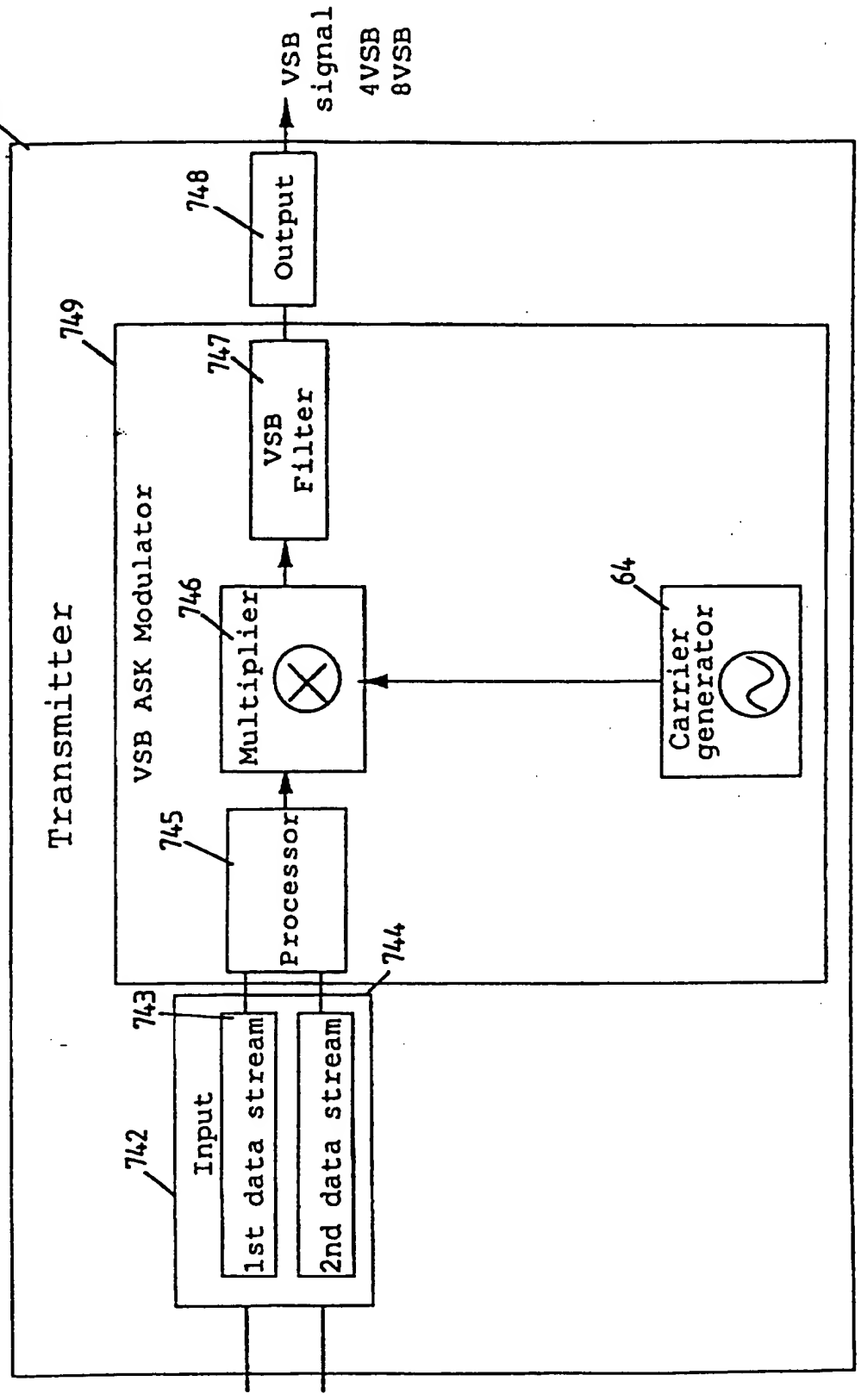

741
VSB signal
4VSB
8VSB
748
Output
749
747
VSB Filter
VSB ASK Modulator
746
Multiplier
64
Carrier generator
Transmitter
745
Processor
744
743
742
Input
1st data stream
2nd data stream

FIG. 61

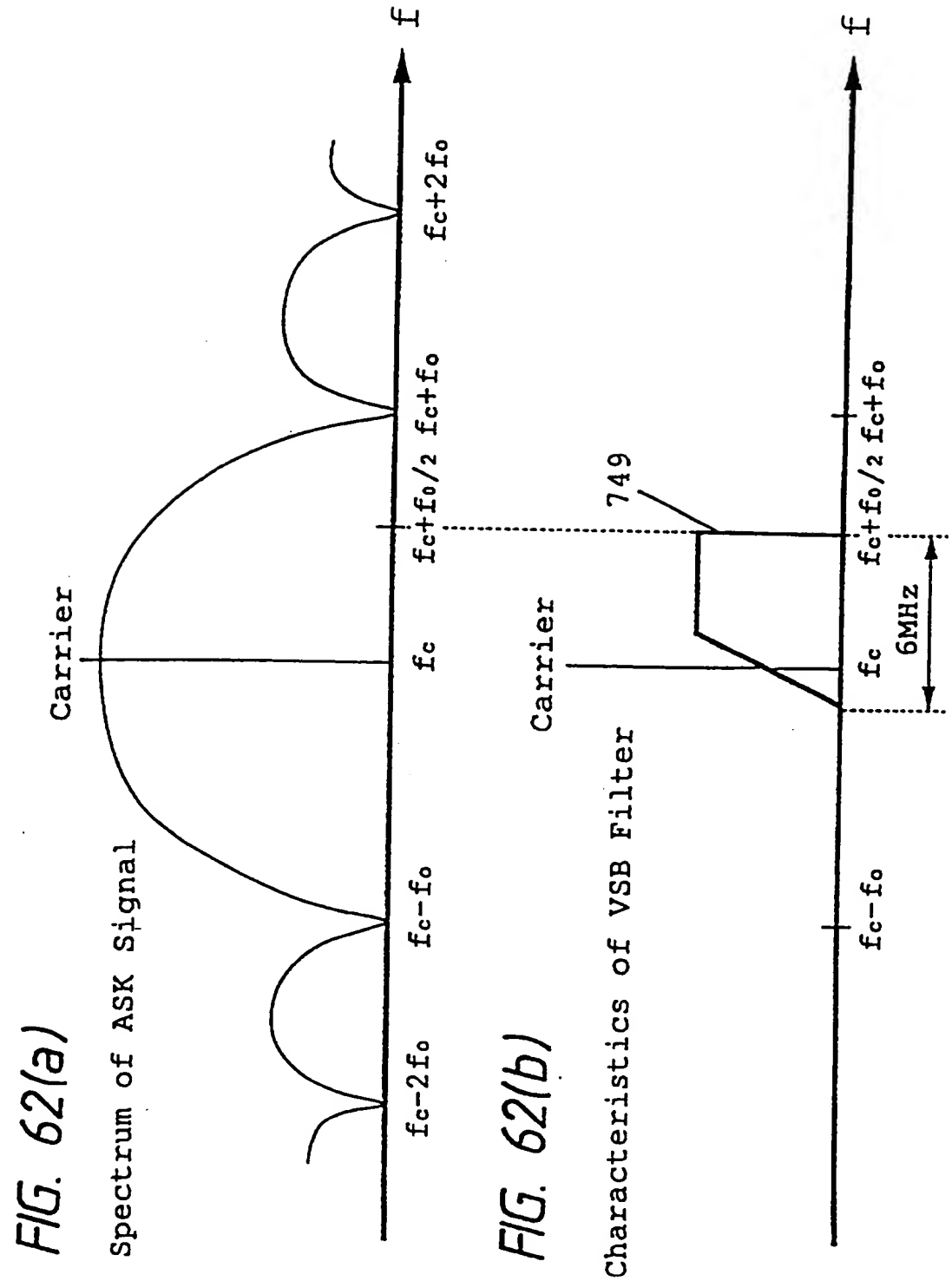


FIG. 62(a)

Spectrum of ASK Signal

FIG. 62(b)

Characteristics of VSB Filter

FIG. 63

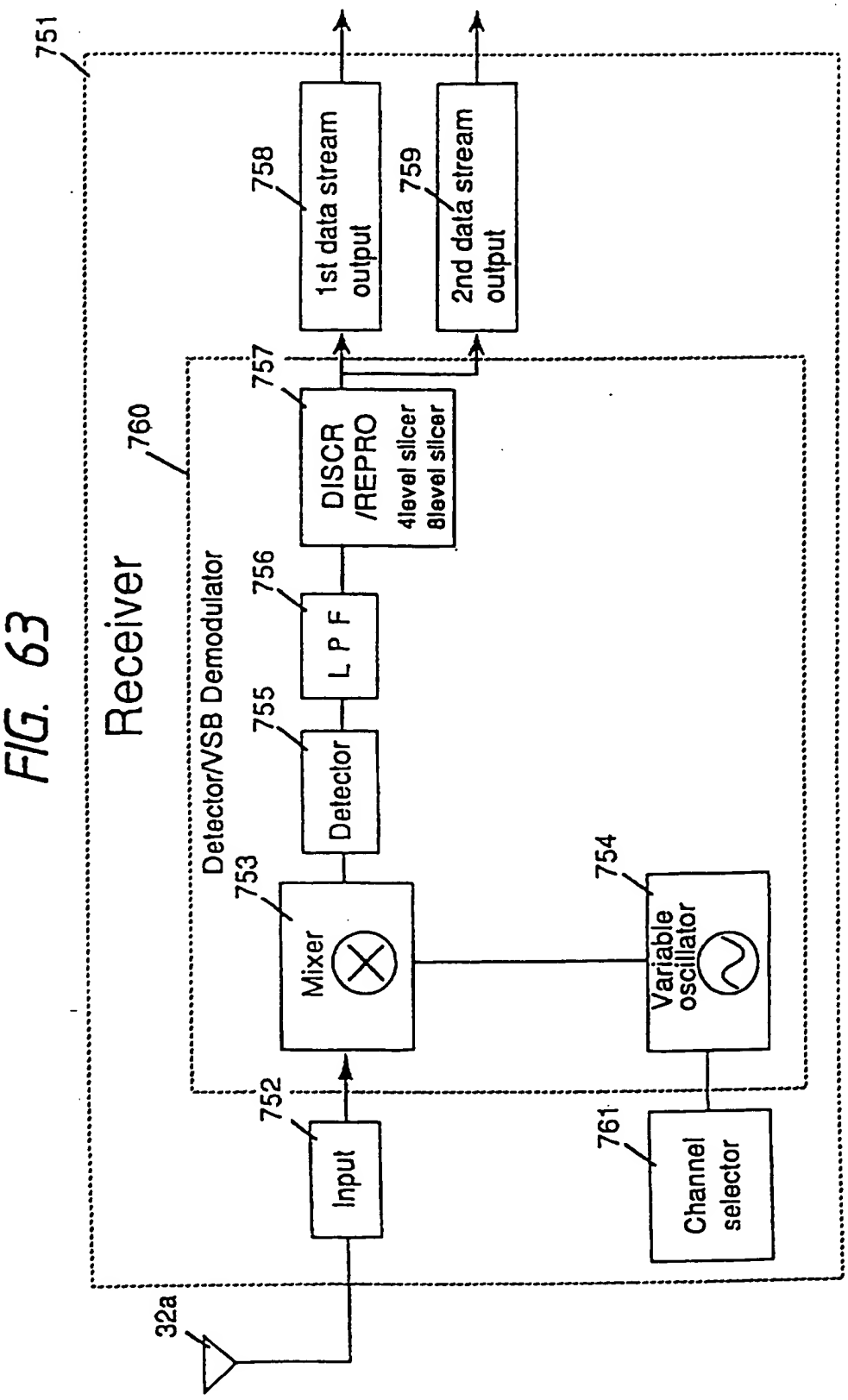

751
Receiver
760
Detector/VSB Demodulator
758
1st data stream output
759
2nd data stream output
757
DISCR /REPRO
4level slicer
8level slicer
756
L P F
755
Detector
753
Mixer
754
Variable oscillator
752
Input
761
Channel selector
32a

FIG. 64

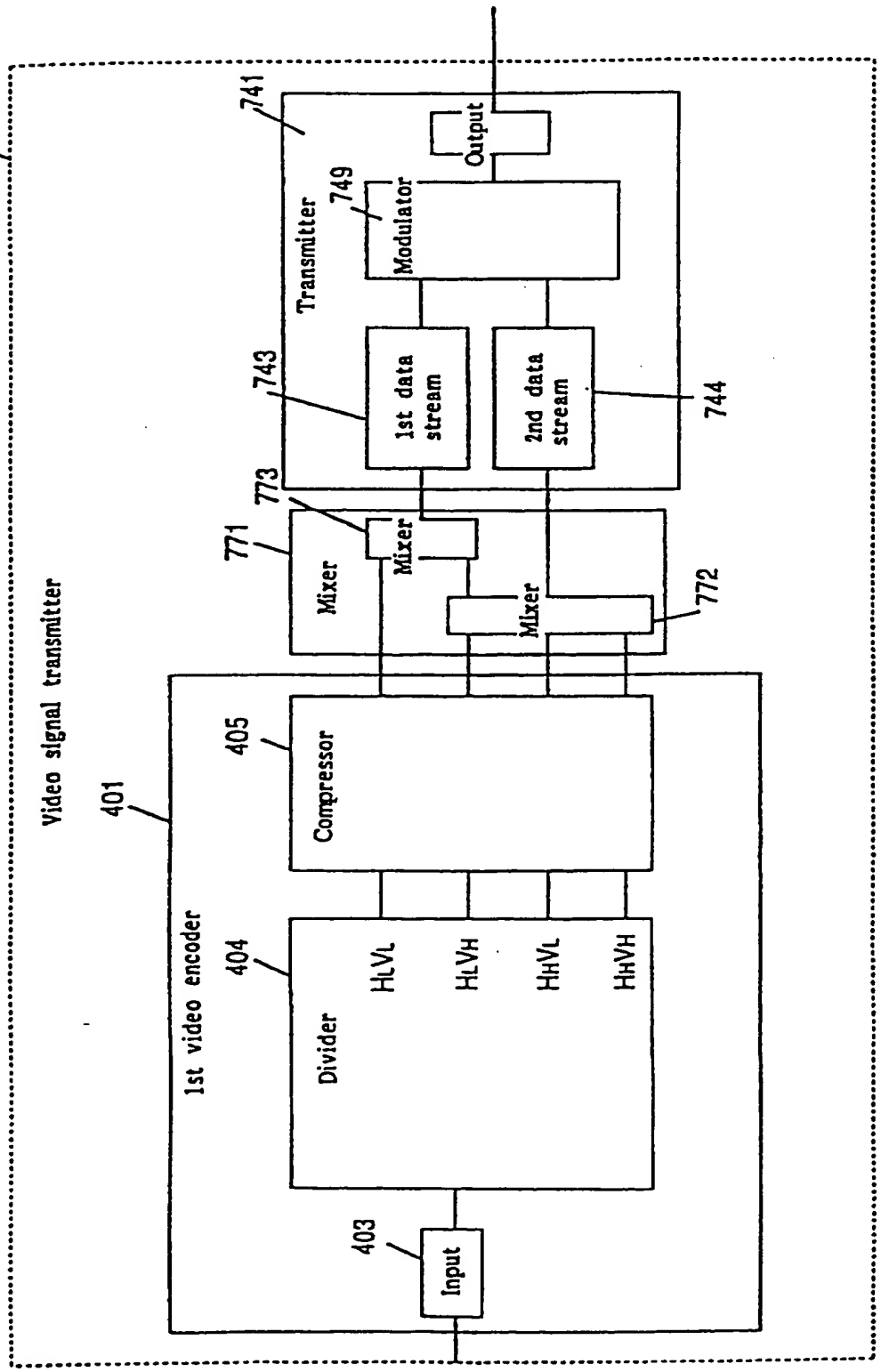
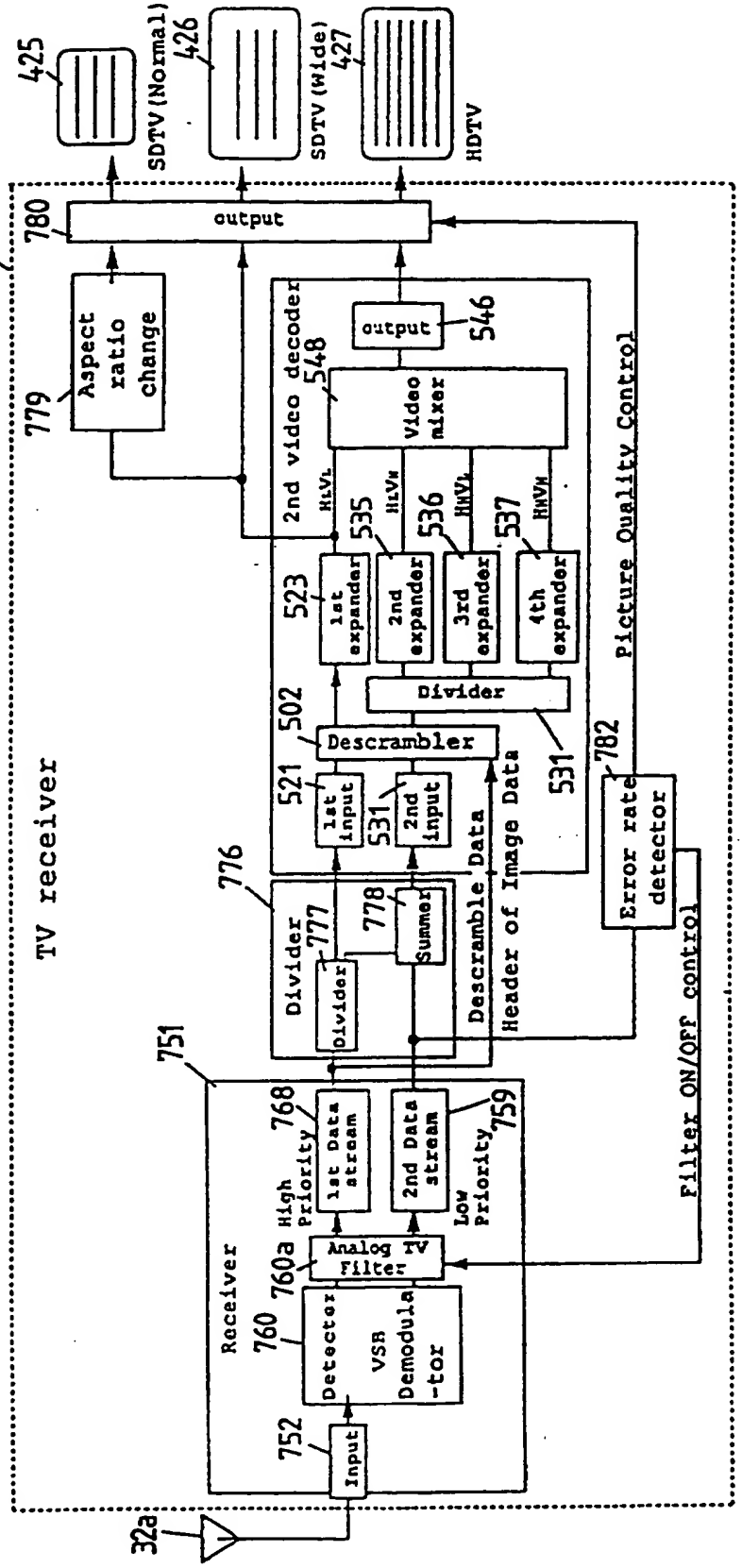

774
Video signal transmitter
741
Transmitter
Output
749
Modulator
743
1st data stream
744
2nd data stream
773
771
Mixer
Mixer
Mixer
772
401
1st video encoder
405
Compressor
404
Divider
HLVL
HLVH
HHVL
HHVH
403
Input

FIG. 65


425
SDTV (Normal)
426
SDTV (Wide)
427
HDTV
781
780
output
779
Aspect ratio change
2nd video decoder
546
548
Video mixer
HLVL
HLVH
HHVL
HHVH
535
536
537
523
1st expander
2nd expander
3rd expander
4th expander
Divider
502
Descrambler
521
1st input
531
2nd input
531
782
Picture Quality Control
Error rate detector
Filter ON/OFF control
776
Divider
777
Divider
778
Summer
Descramble Data
Header of Image Data
751
768
1st Data stream
High Priority
759
2nd Data stream
Low Priority
Analog TV Filter
760a
760
Detector
VSB Demodula -tor
752
Input
Receiver
TV receiver
32a

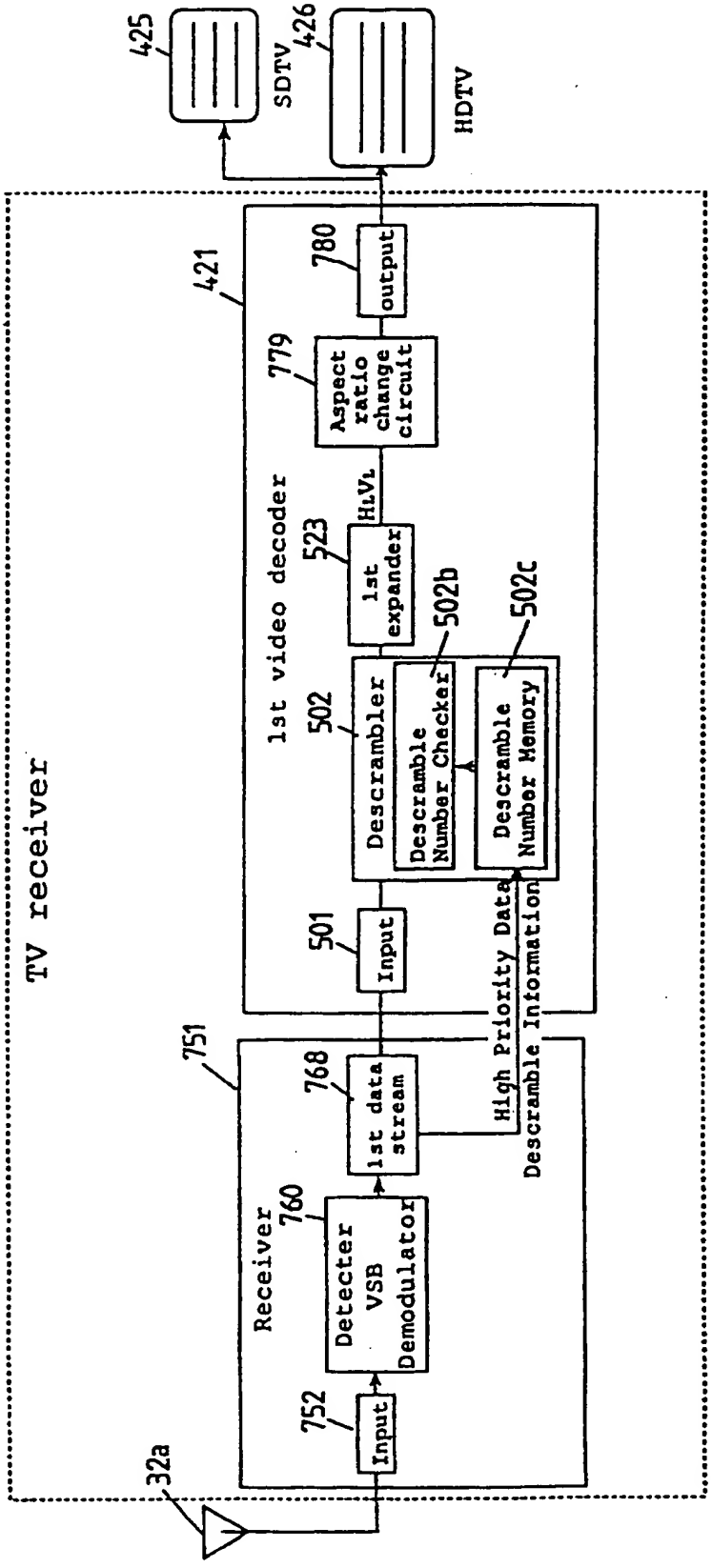

425
SDTV
426
HDTV
TV receiver
421
1st video decoder
780
output
779
Aspect ratio change circuit
523
1st expander
H/L/VL
502
Descrambler
502b
Descramble Number Checker
502c
Descramble Number Memory
501
Input
High Priority Data Descramble Information
751
Receiver
768
1st data stream
760
Detecter VSB Demodulator
752
Input
32a

FIG. 66

FIG. 67

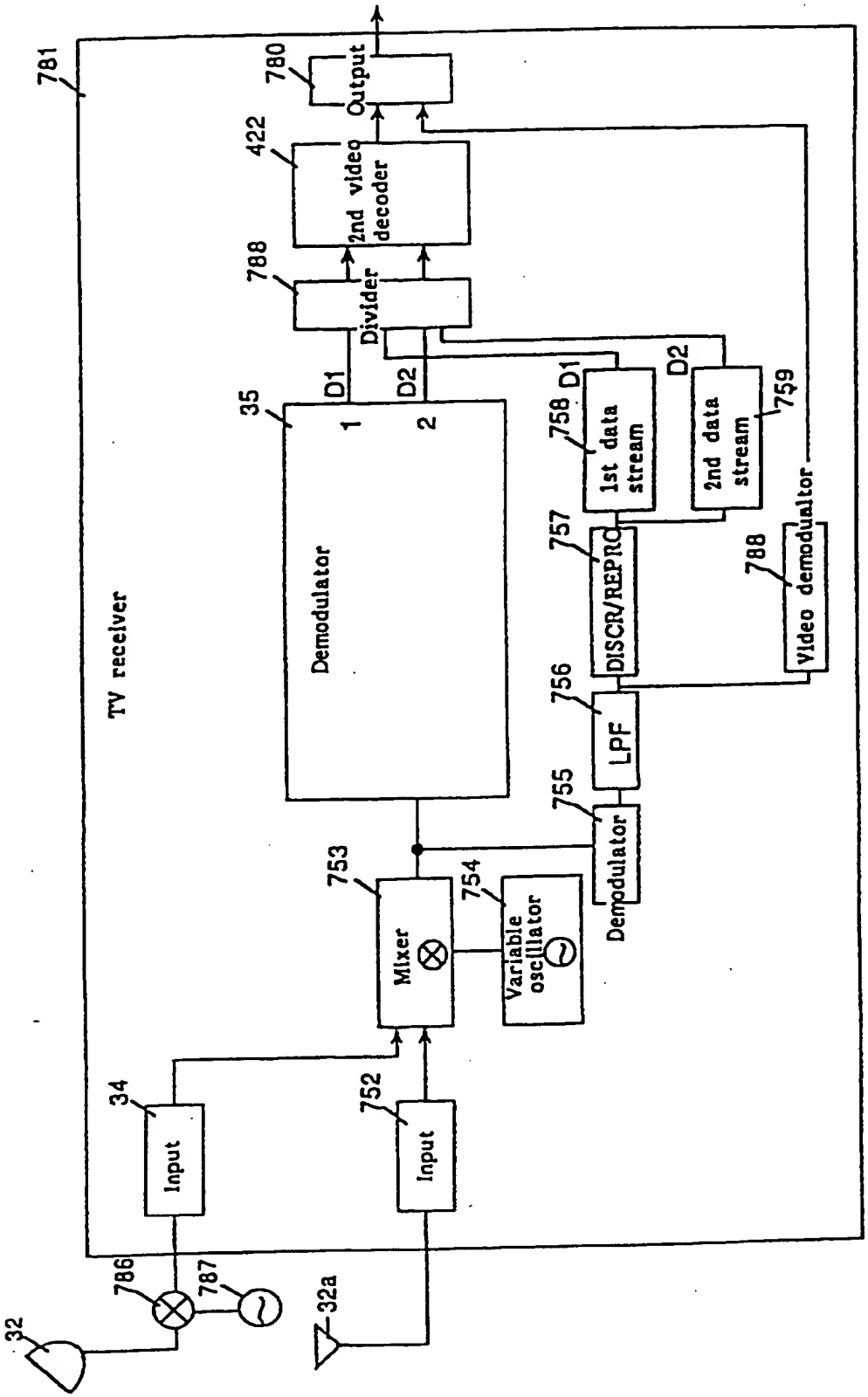

781
TV receiver
780
Output
422
2nd video decoder
788
Divider
D1
D2
35
Demodulator
1
2
758
1st data stream
759
2nd data stream
757
DISCR/REPRO
788
Video demodulator
756
LPF
755
Demodulator
753
Mixer
754
Variable oscillator
34
Input
752
Input
786
787
32
32a

FIG. 68(a)

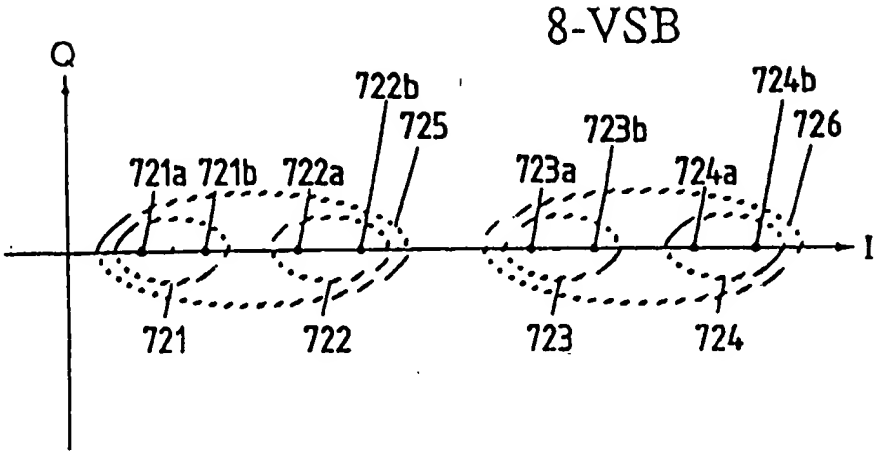


FIG. 68(b)

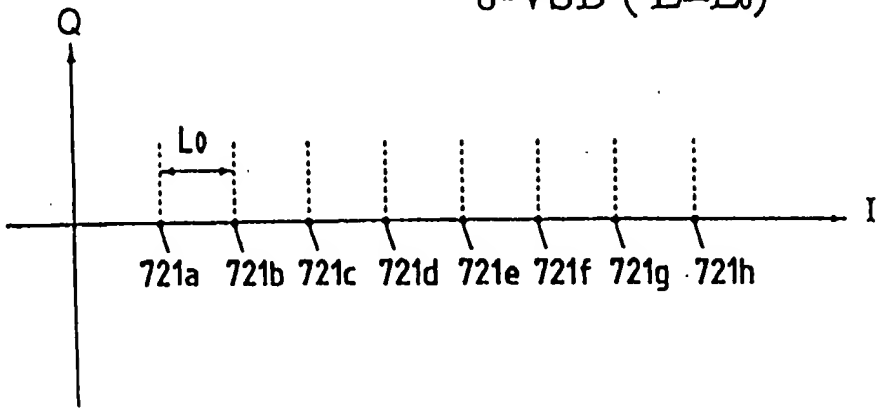


FIG. 68(c)

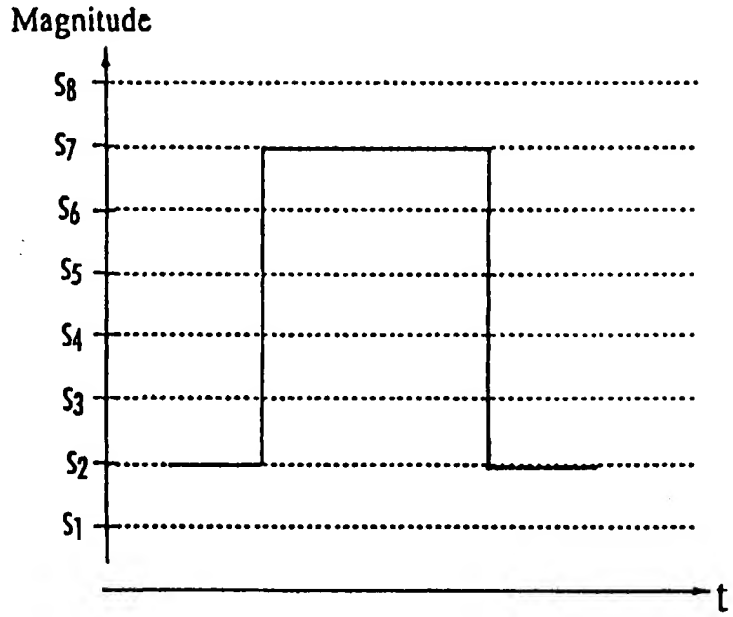
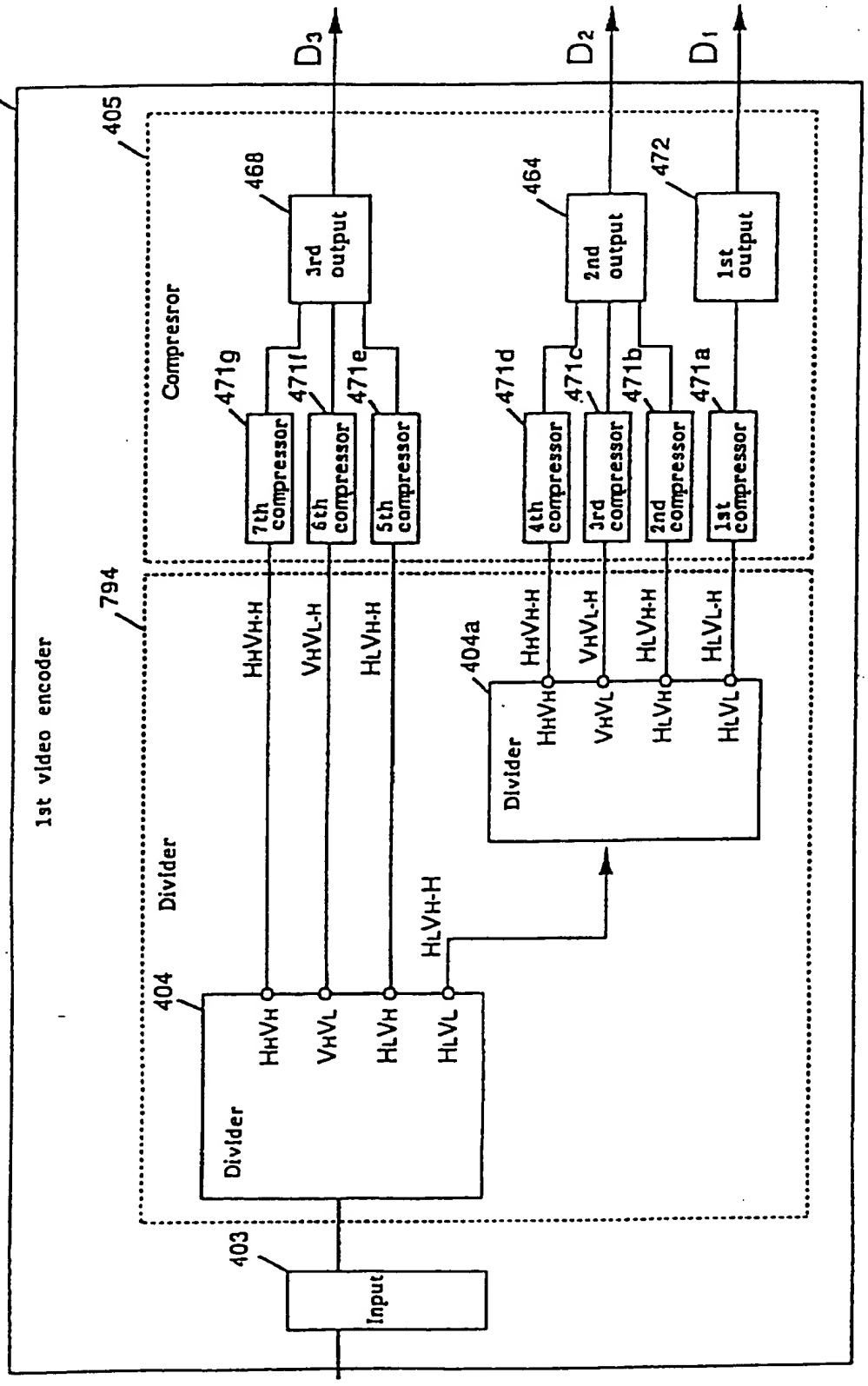


FIG. 69


401
405
Compresror
794
1st video encoder
Divider
404
Divider
403
Input
D3
D2
D1
468
3rd output
464
2nd output
472
1st output
471g
7th compressor
471f
6th compressor
471e
5th compressor
471d
4th compressor
471c
3rd compressor
471b
2nd compressor
471a
1st compressor
HHVH-H
VHVL-H
HLVH-H
HLVL-H
HHVH
VHVL
HLVH
HLVL
404a
Divider
HHVH
VHVL
HLVH
HLVL

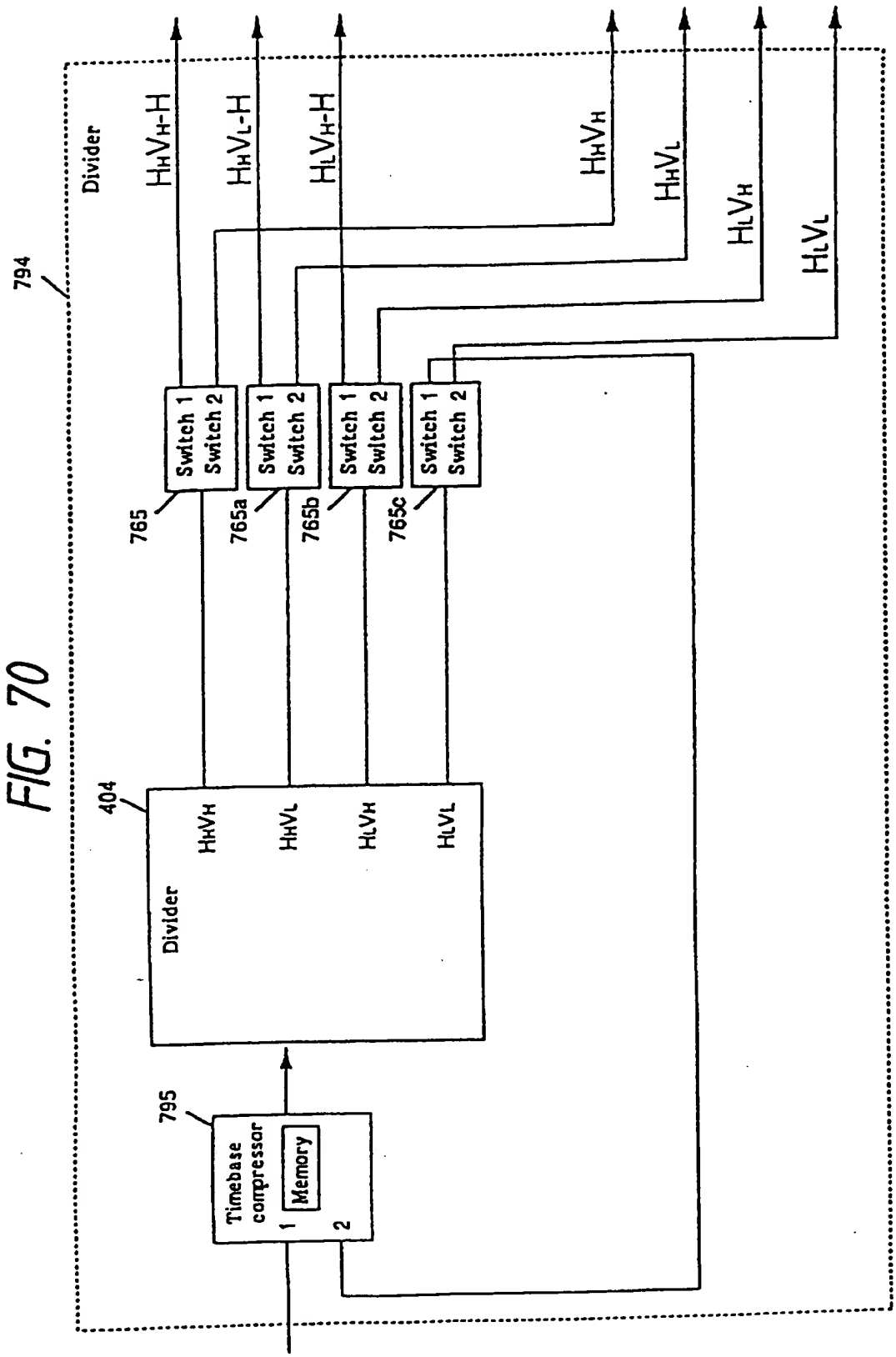
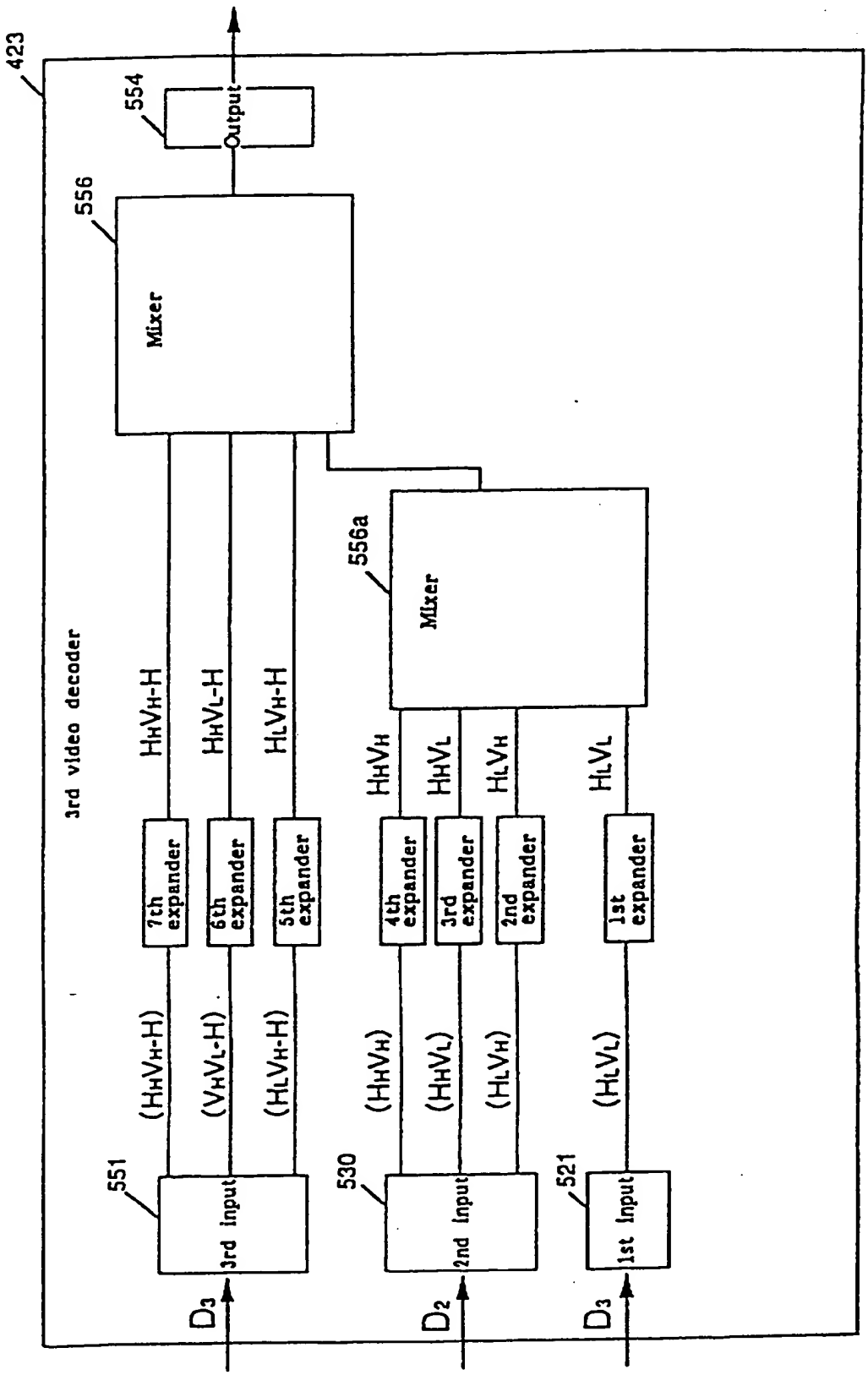

794
Divider
HHVH-H
HHVL-H
HLVH-H
HHVH
HHVL
HLVH
HLVL
Switch 1
Switch 2
765
765a
765b
765c
404
Divider
HHVH
HHVL
HLVH
HLVL
795
Timebase compressor
Memory
1
2

FIG. 70

FIG. 71


423
3rd video decoder
554
Output
556
Mixer
556a
Mixer
HHVH-H
HHVL-H
HLVH-H
HHVH
HHVL
HLVH
HLVL
7th expander
6th expander
5th expander
4th expander
3rd expander
2nd expander
1st expander
(HHVH-H)
(VHVL-H)
(HLVH-H)
(HHVH)
(HHVL)
(HLVH)
(HLVL)
551
3rd Input
530
2nd Input
521
1st Input
D3
D2
D3

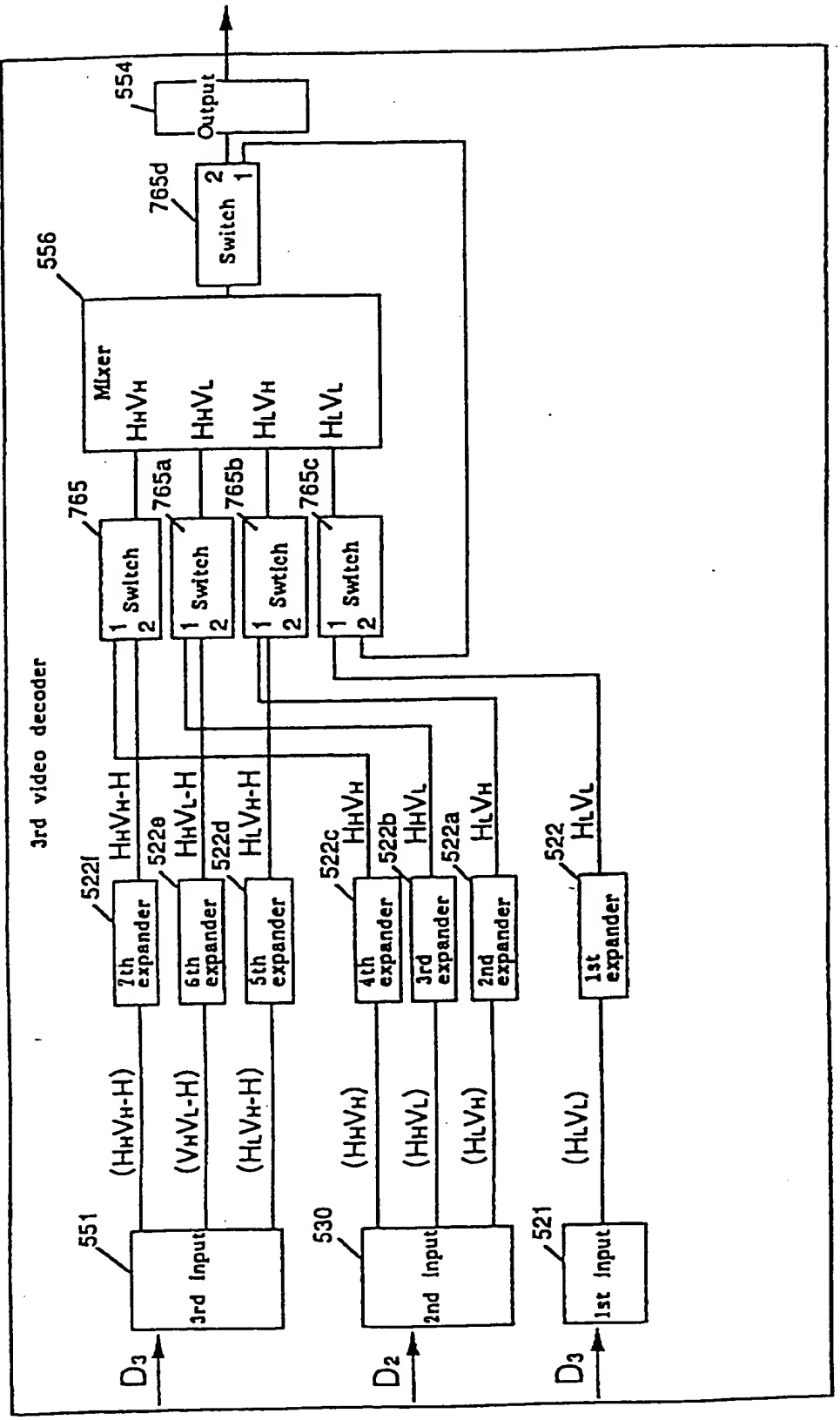
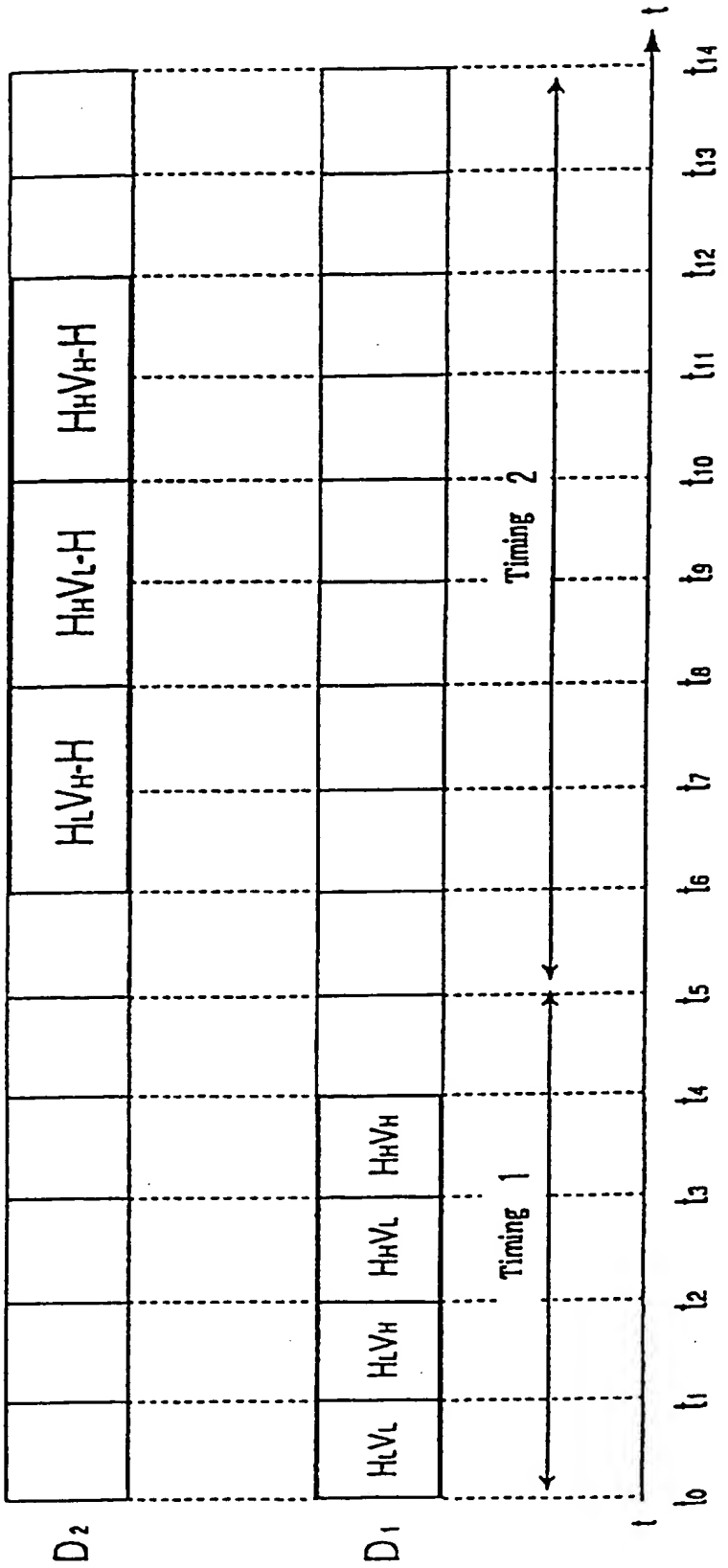

423
3rd video decoder
554
Output
765d
Switch
556
Mixer
HHVH
HHVL
HLVH
HLVL
765
765a
765b
765c
Switch
522l
522e
522d
522c
522b
522a
522
7th expander
6th expander
5th expander
4th expander
3rd expander
2nd expander
1st expander
(HHVH-H)
(VHVL-H)
(HLVH-H)
(HHVH)
(HHVL)
(HLVH)
(HLVL)
551
530
521
3rd Input
2nd Input
1st Input
D3
D2
D3

FIG. 72

FIG. 73


t
t14
t13
t12
t11
t10
t9
t8
t7
t6
t5
t4
t3
t2
t1
t0
t
D2
D1
HLVH-H
HHVL-H
HHVH-H
HLVL
HLVH
HHVL
HHVH
Timing 1
Timing 2

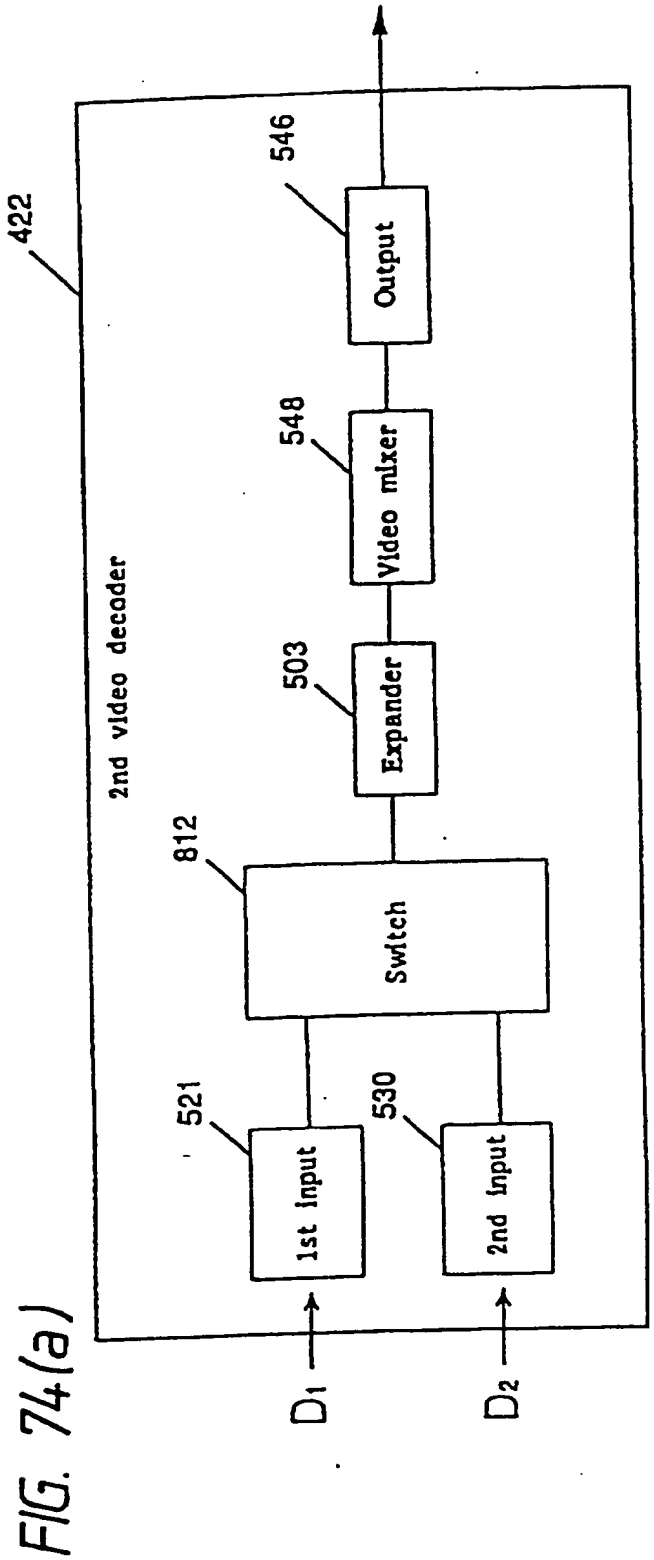


FIG. 74(a)

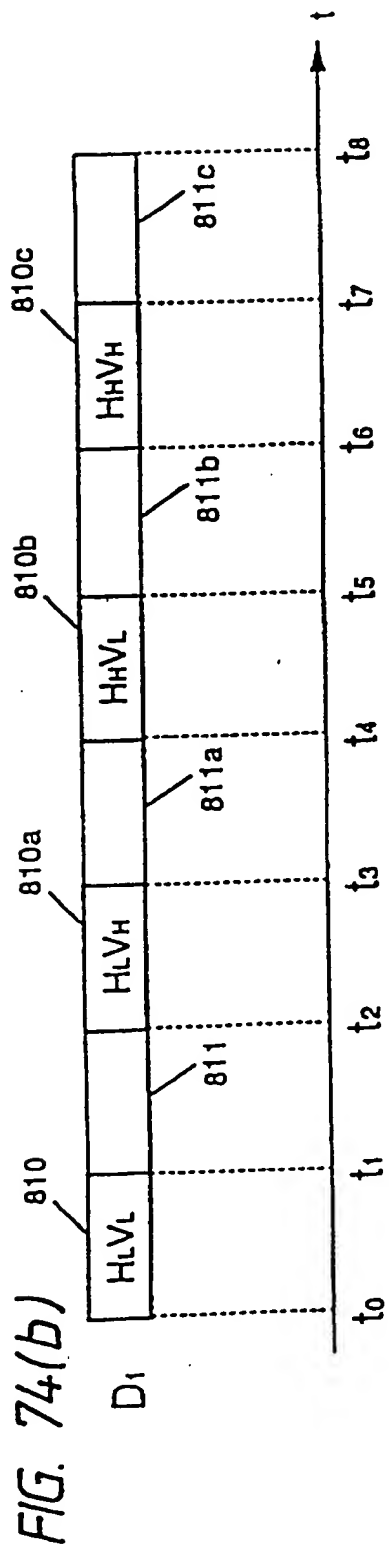


FIG. 74(b)

FIG. 75

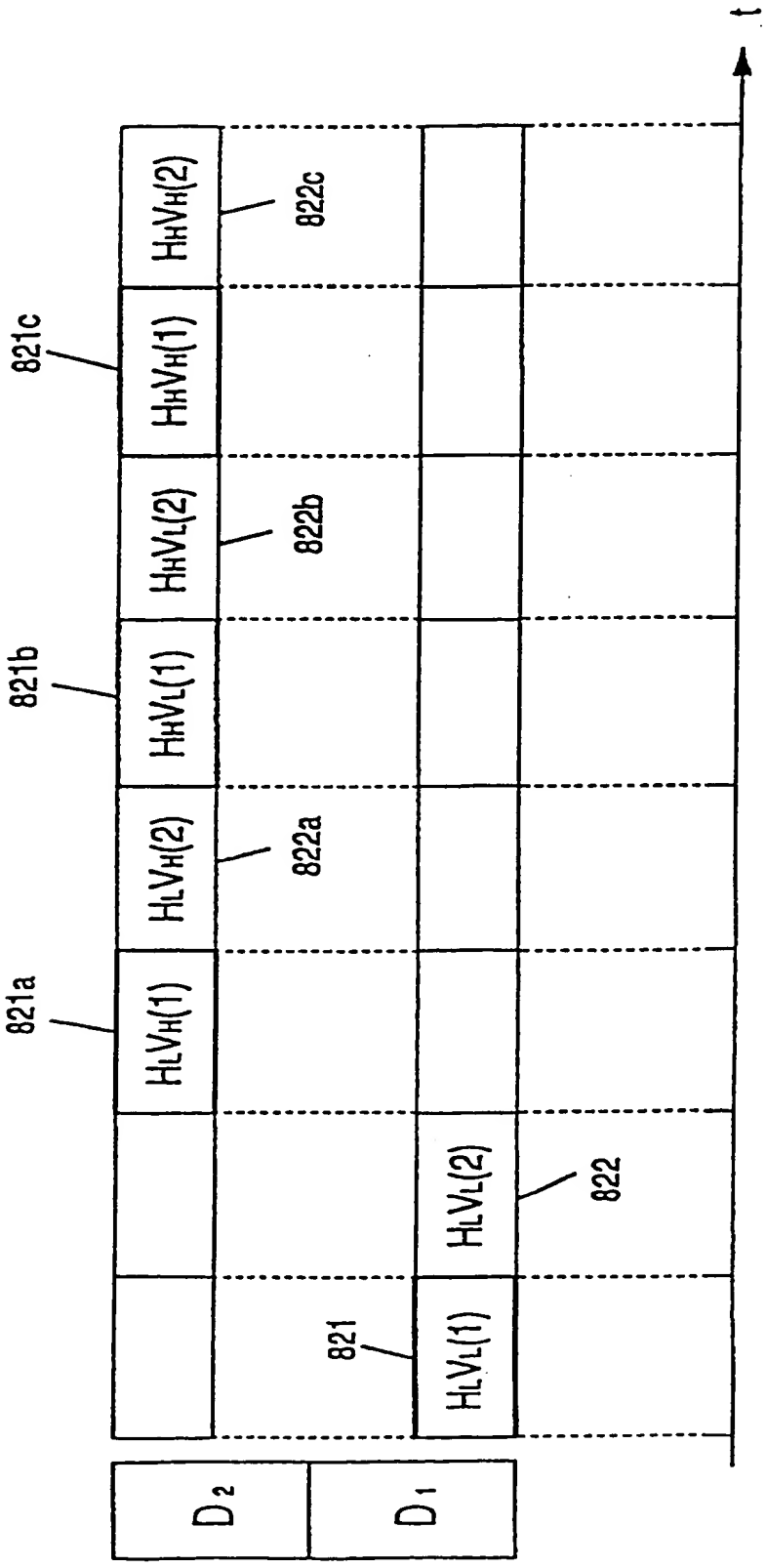

t
821c
821b
821a
822c
822b
822a
822
821
HHVH(2)
HHVH(1)
HHVL(2)
HHVL(1)
HLVH(2)
HLVH(1)
HLVL(2)
HLVL(1)
D2
D1

FIG. 76

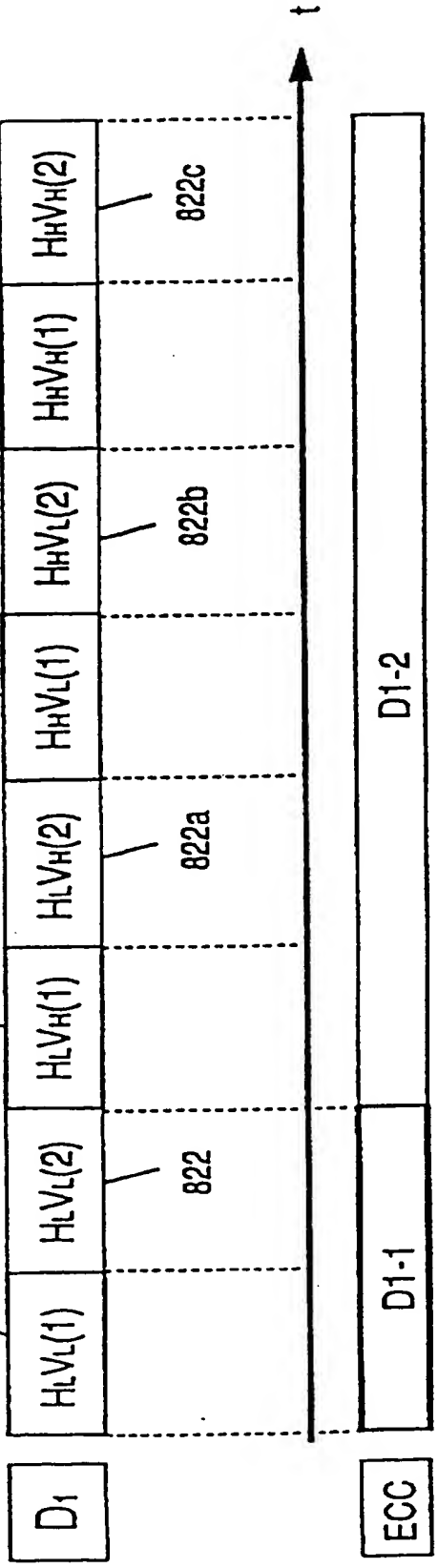

t
D1
ECC
D1-1
D1-2
821
821a
821b
821c
822
822a
822b
822c
HLVL(1)
HLVL(2)
HLVH(1)
HLVH(2)
HHVL(1)
HHVL(2)
HHVH(1)
HHVH(2)

FIG. 77

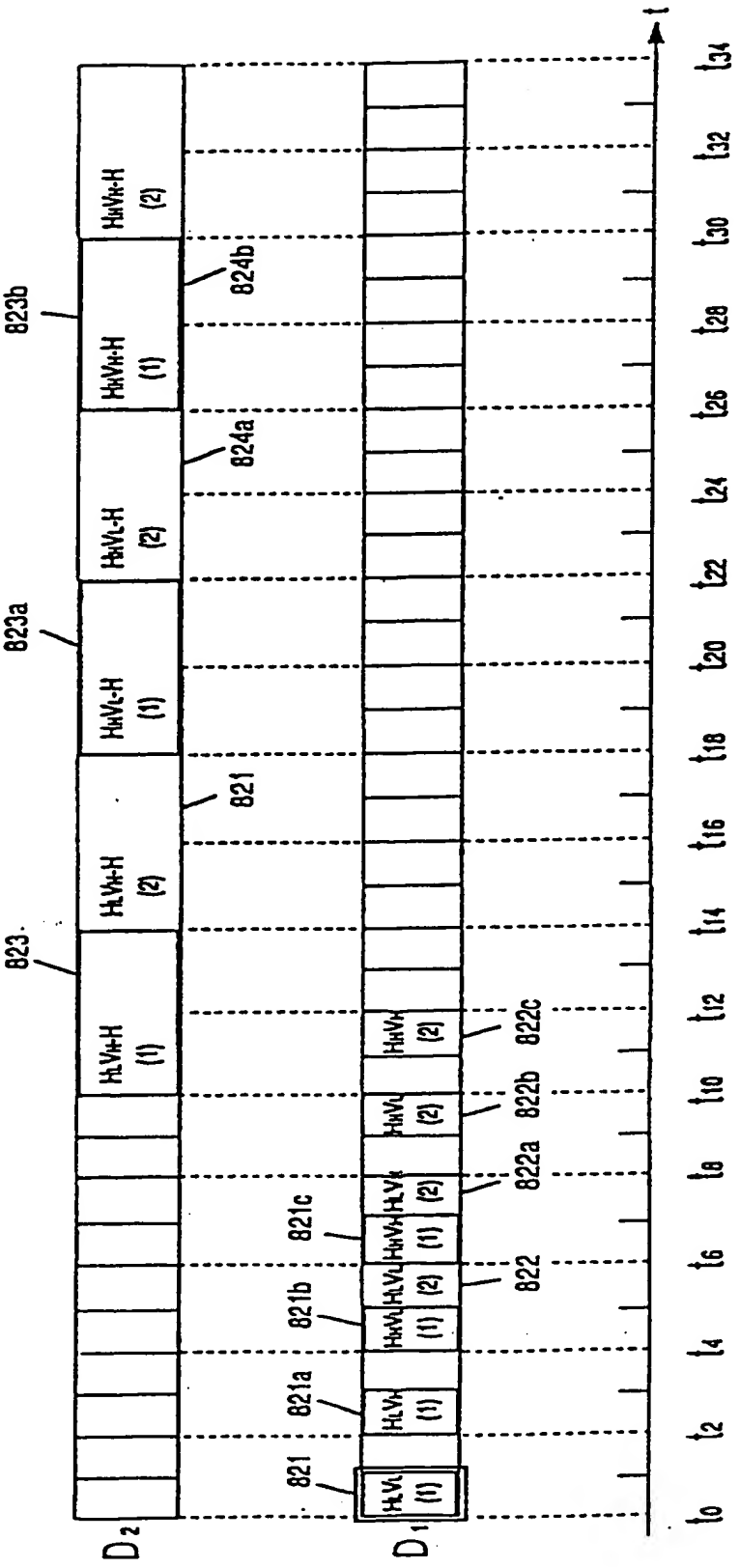

t
t0
t2
t4
t6
t8
t10
t12
t14
t16
t18
t20
t22
t24
t26
t28
t30
t32
t34
D2
D1
821
821a
821b
821c
822
822a
822b
822c
823
823a
823b
824a
824b
HLVH-H (1)
HLVH (2)
HLVL (1)
HLVL (2)
HHVH-H (1)
HHVH-H (2)
HHVL-H (1)
HHVL-H (2)
HHVH (1)
HHVH (2)
HHVL (1)
HHVL (2)

FIG. 78

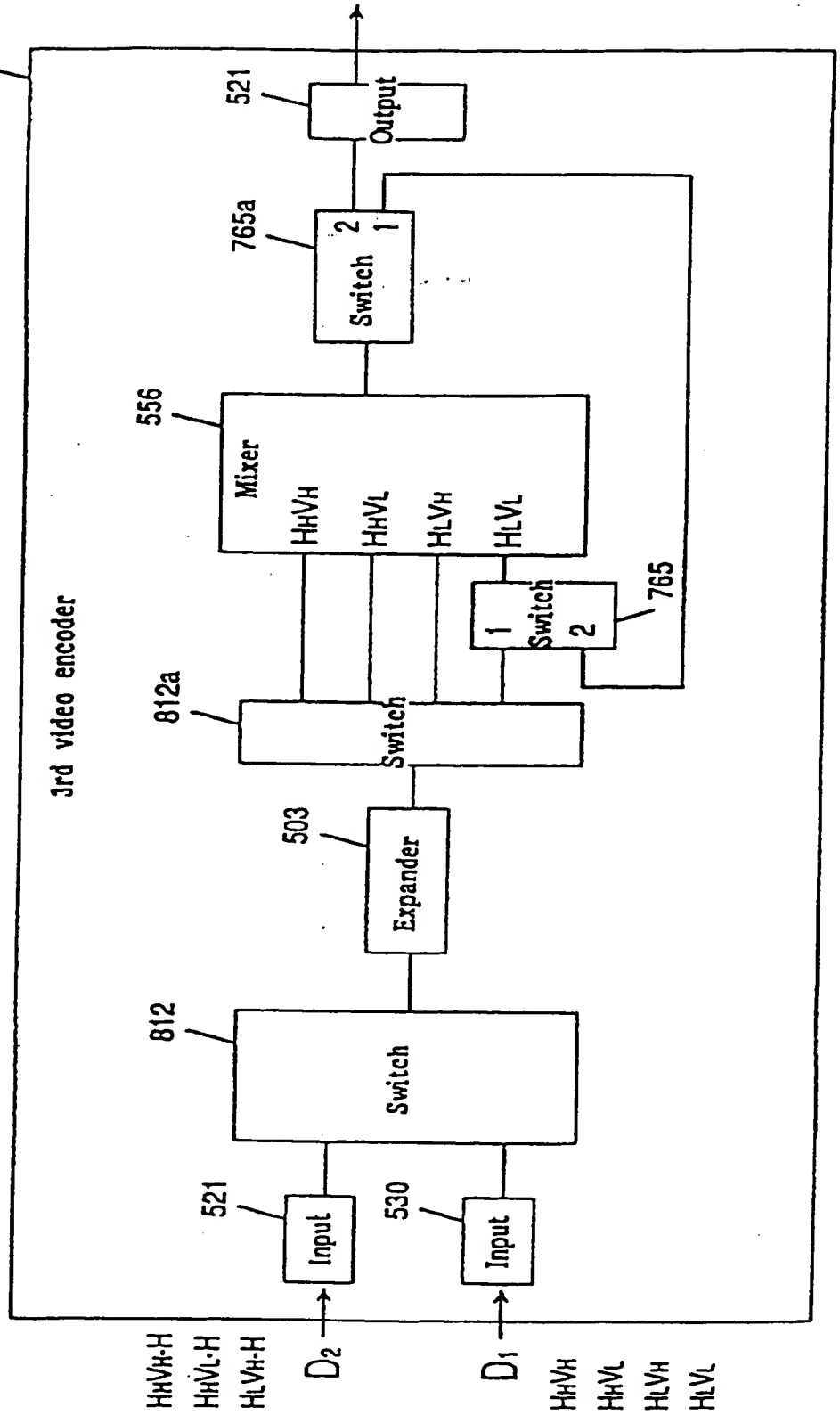

521
3rd video encoder
521
Output
765a
Switch
556
Mixer
HHVH
HHVL
HLVH
HLVL
765
Switch
812a
Switch
503
Expander
812
Switch
521
Input
530
Input
HHVH-H
HHVL-H
HLVH-H
D2
D1
HHVH
HHVL
HLVH
HLVL

FIG. 79

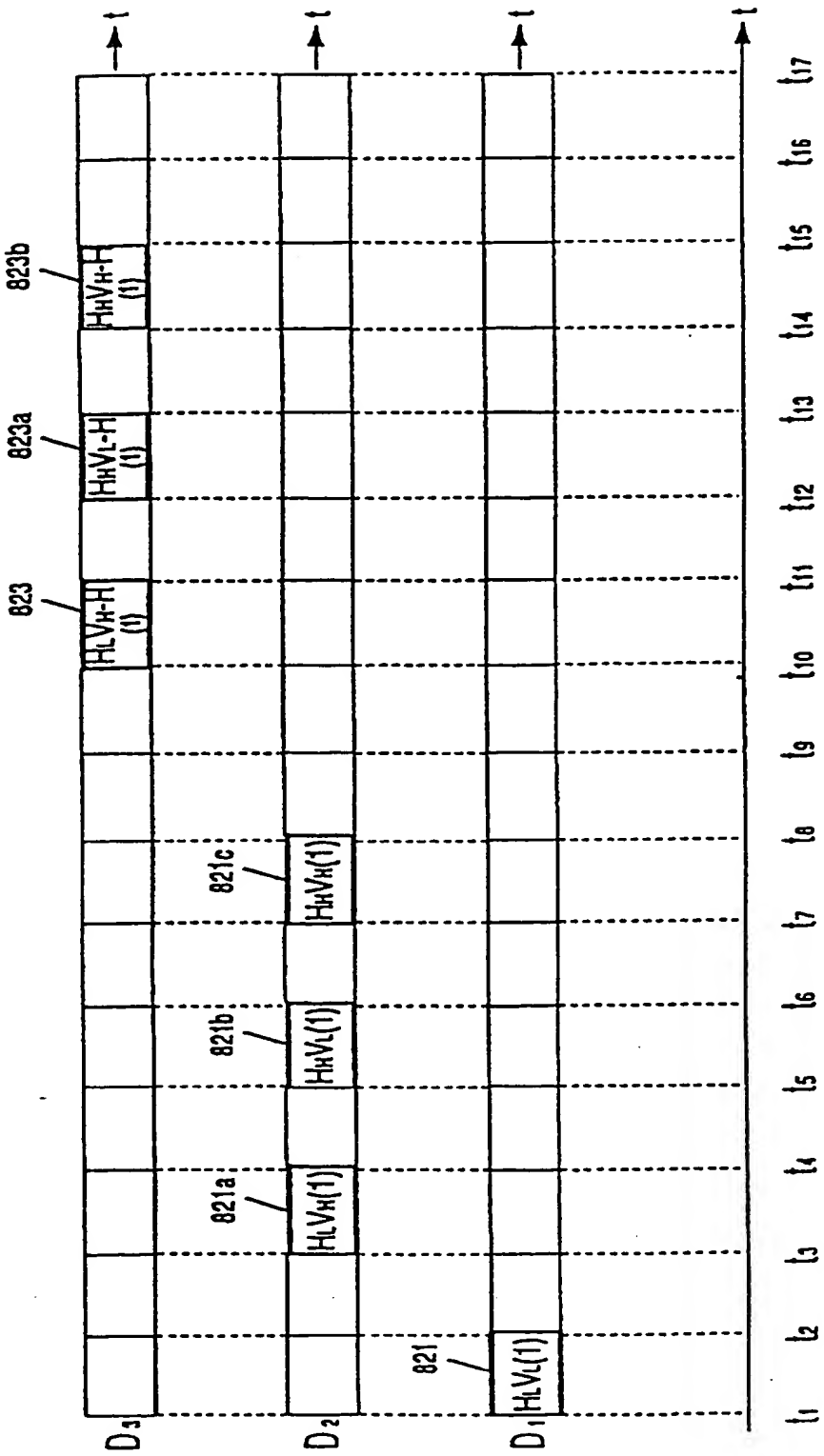
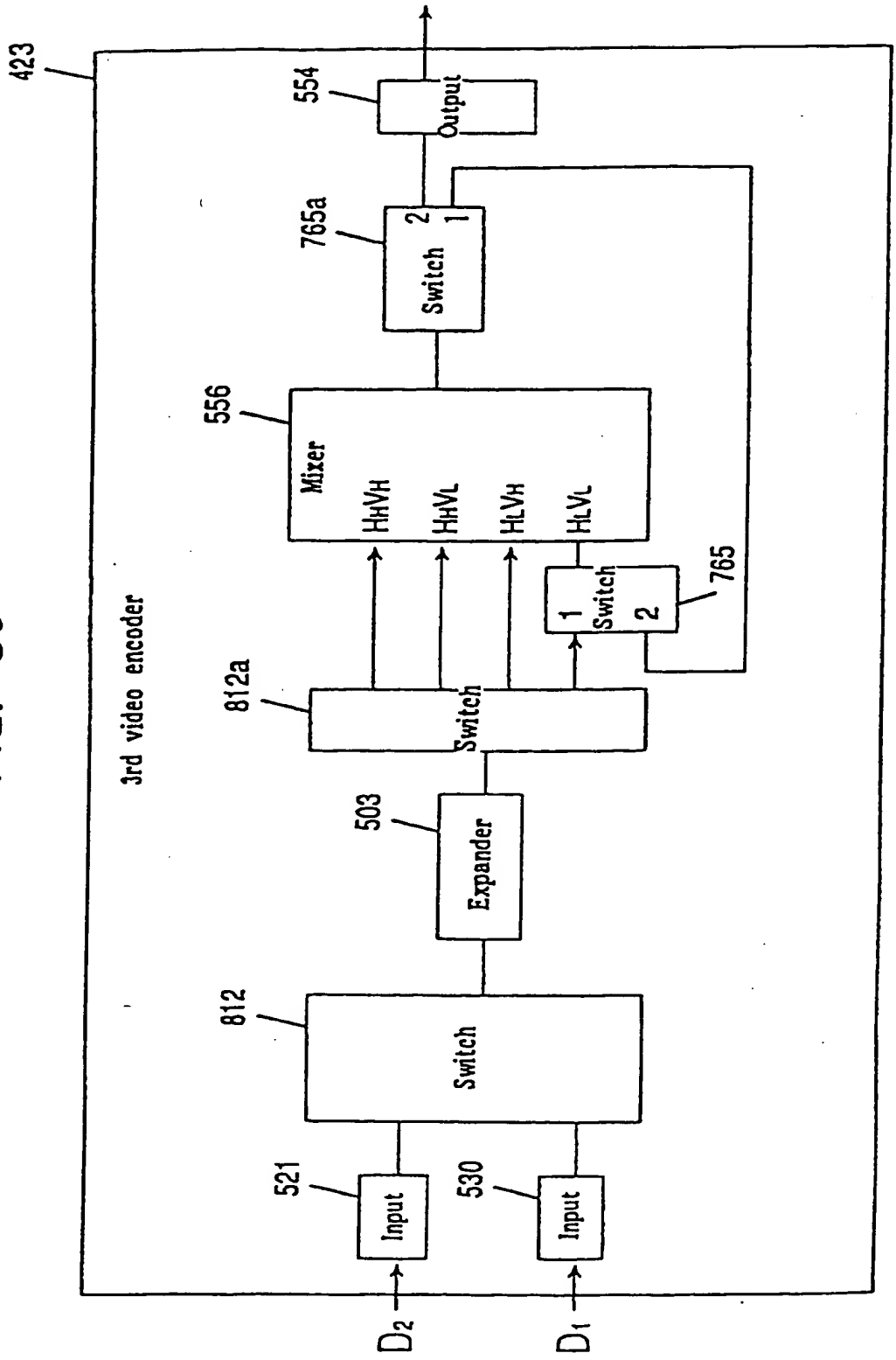

t
t
t
t
t1
t2
t3
t4
t5
t6
t7
t8
t9
t10
t11
t12
t13
t14
t15
t16
t17
D3
D2
D1
821
821a
821b
821c
823
823a
823b
HLVL(1)
HLVH(1)
HHVL(1)
HHVH(1)
HLVH-H (1)
HHVL-H (1)
HHVH-H (1)

FIG. 80


423
3rd video encoder
554
Output
765a
Switch
2
1
556
Mixer
HHVH
HHVL
HLVH
HLVL
765
Switch
1
2
812a
Switch
503
Expander
812
Switch
521
Input
530
Input
D2
D1

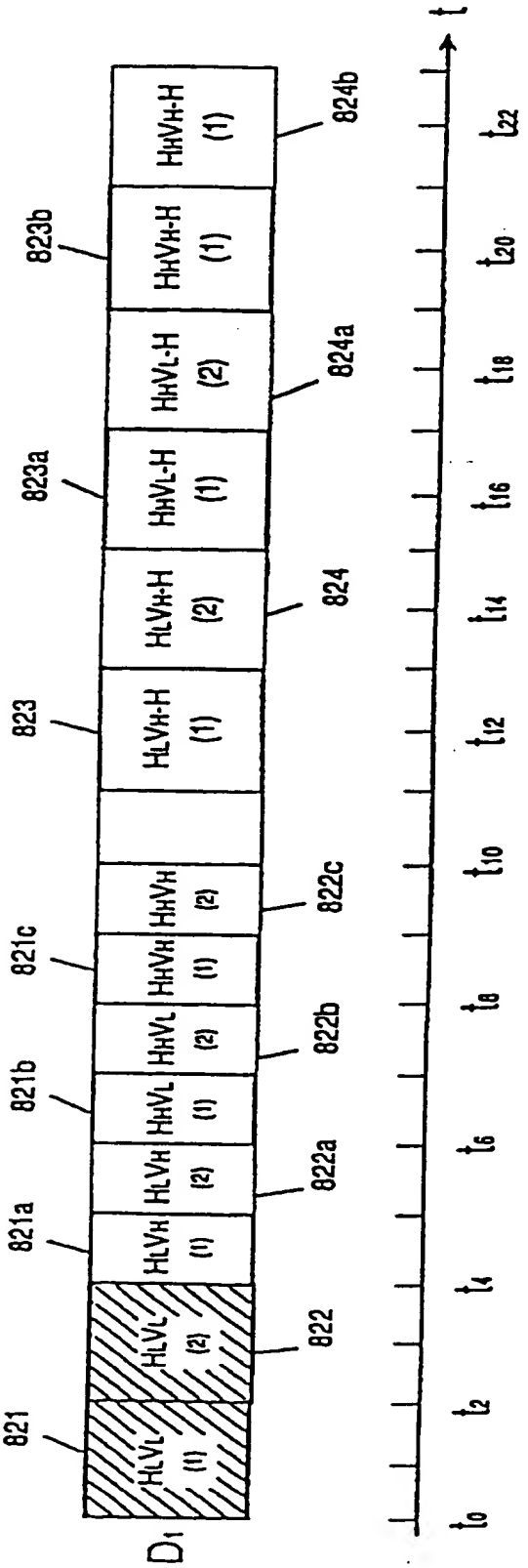

D1
821
822
821a
822a
821b
822b
821c
822c
823
824
823a
824a
823b
824b
HLVL (1)
HLVL (2)
HLVH (1)
HLVH (2)
HHVL (1)
HHVL (2)
HHVH (1)
HHVH (2)
HLVH-H (1)
HLVH-H (2)
HHVL-H (1)
HHVL-H (2)
HHVH-H (1)
HHVH-H (1)
t0
t2
t4
t6
t8
t10
t12
t14
t16
t18
t20
t22
t

FIG. 81

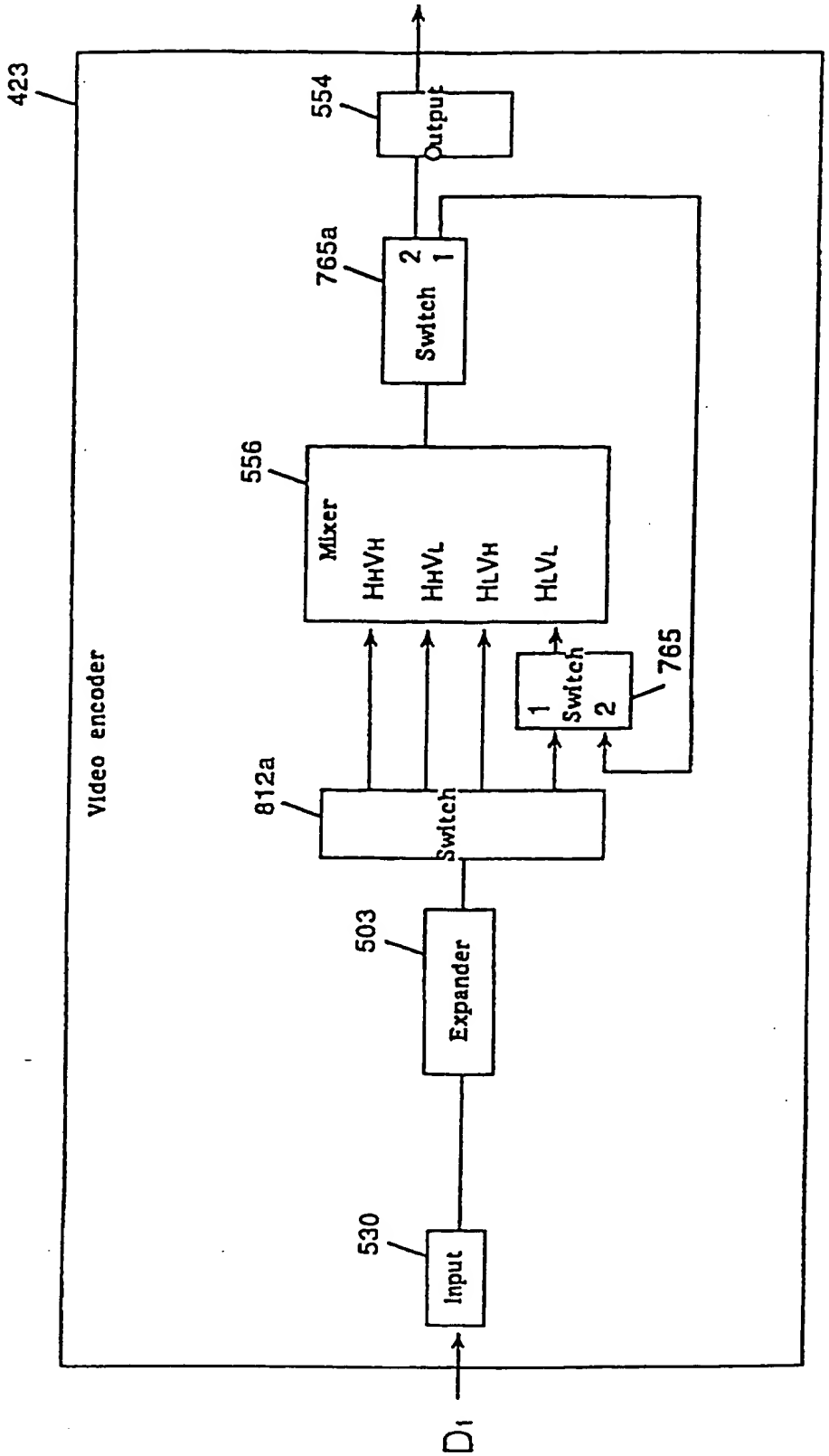

423
Video encoder
554
Output
765a
Switch
2
1
556
Mixer
HHVH
HHVL
HLVH
HLVL
765
Switch
1
2
812a
Switch
503
Expander
530
Input
D1

FIG. 82

FIG. 83

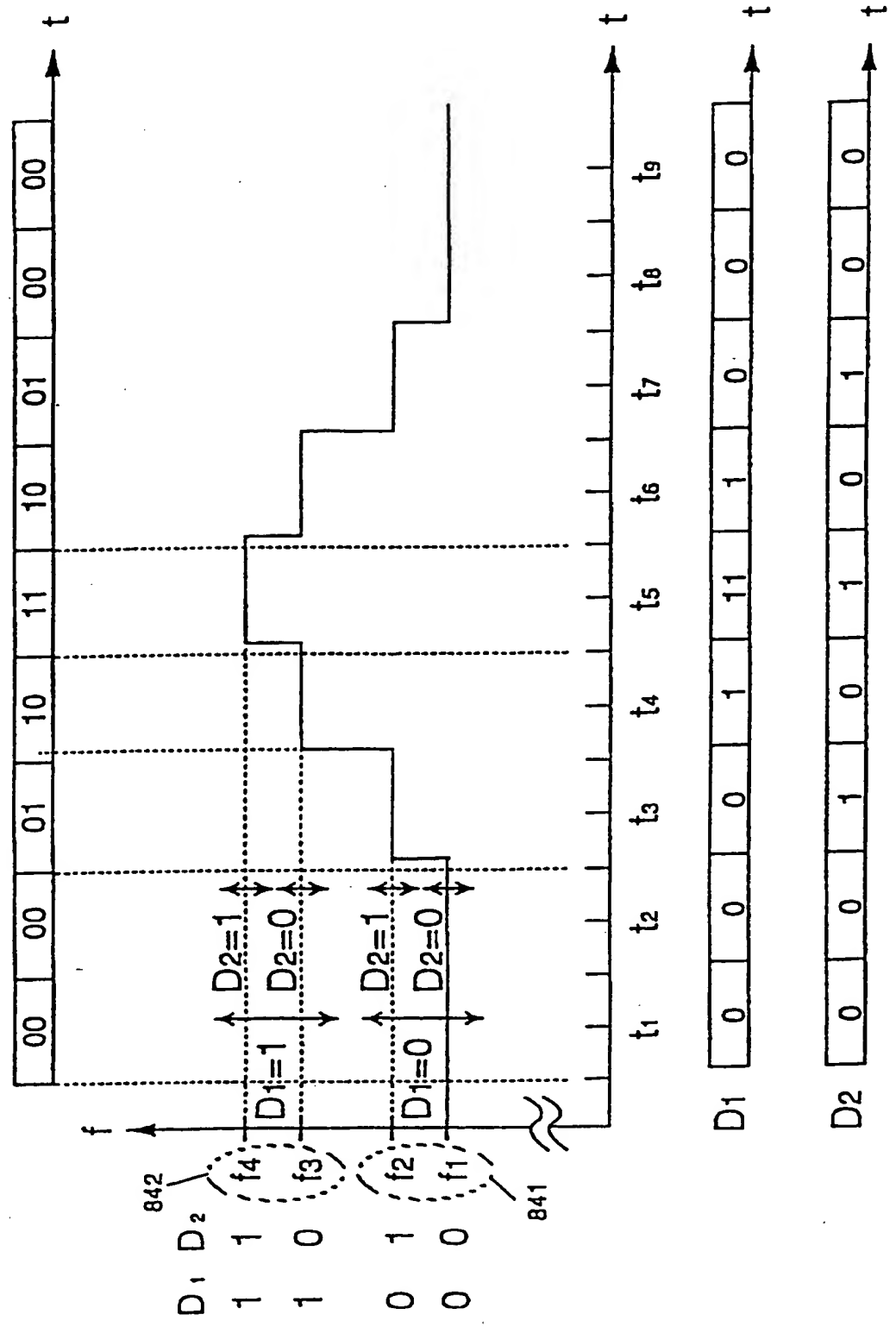
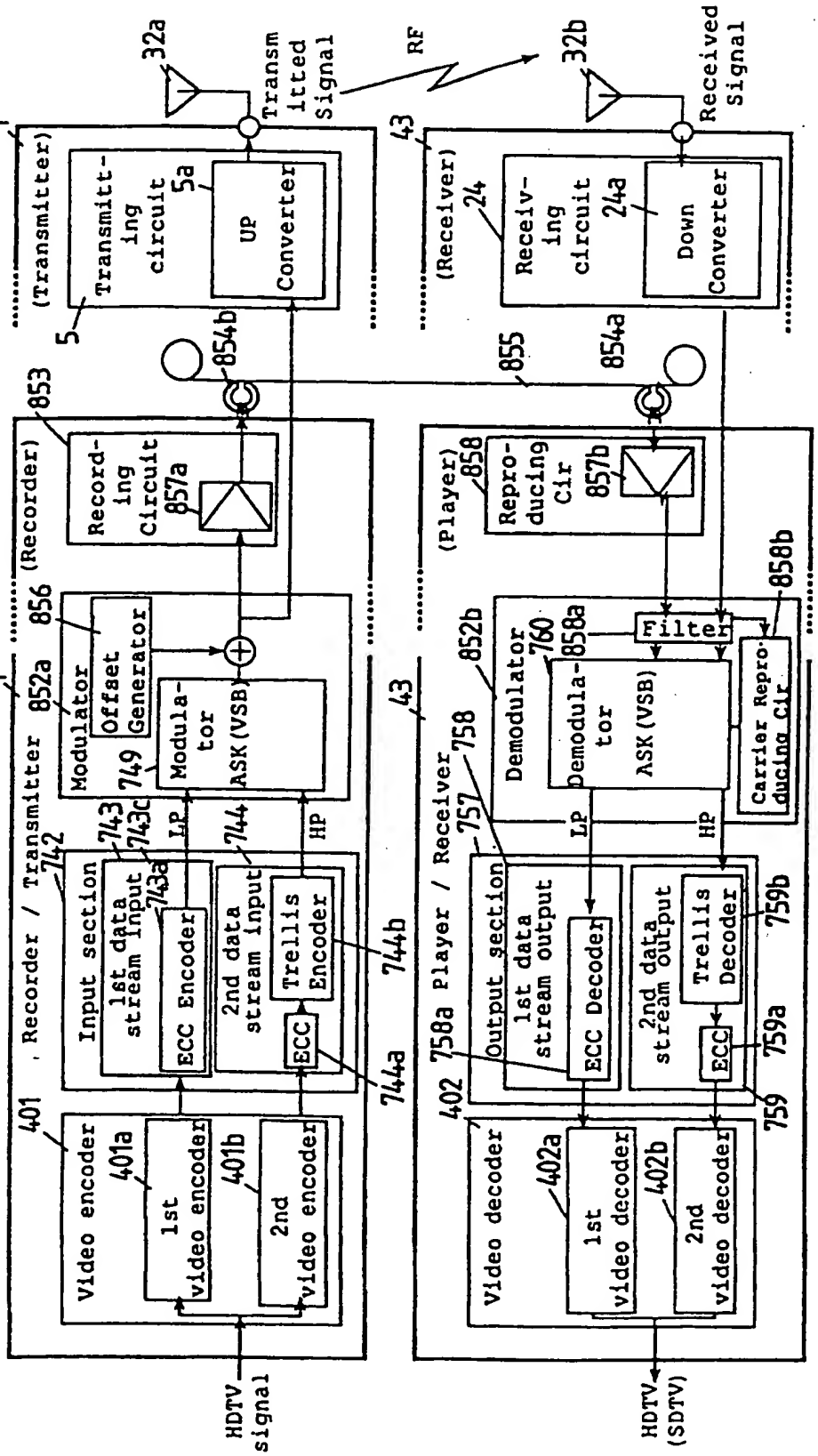

t
00
00
00
01
10
11
10
01
00
00
D2=1
D2=0
D2=1
D2=0
D1=1
D1=0
f
842
f4
f3
f2
f1
841
D1 D2
1 1
1 0
0 1
0 0
t1
t2
t3
t4
t5
t6
t7
t8
t9
D1
D2

FIG. 84


1
(Transmitter)
5
Transmitting circuit 5a
UP Converter
32a
Transmitted Signal
RF
32b
Received Signal
43
(Receiver)
24
Receiving circuit 24a
Down Converter
854b
855
854a
853
(Recorder)
Recording circuit 857a
858
(Player)
Reproducing Cir 857b
856
Modulator 852a
Offset Generator 749
Modulator ASK (VSB)
Demodulator 852b
Demodulator ASK (VSB) 760
Filter 858a
Carrier Reproducing Cir 858b
Recorder / Transmitter 742
Player / Receiver 758
Input section 743
1st data stream Input 743a
ECC Encoder 743c
2nd data stream Input 744
Trellis Encoder 744b
ECC 744a
LP
HP
Output section 757
1st data stream output
ECC Decoder
2nd data stream output
Trellis Decoder 759b
ECC 759a
759
401
Video encoder
401a
1st video encoder
401b
2nd video encoder
402
Video decoder
402a
1st video decoder
402b
2nd video decoder
HDTV signal
HDTV (SDTV)

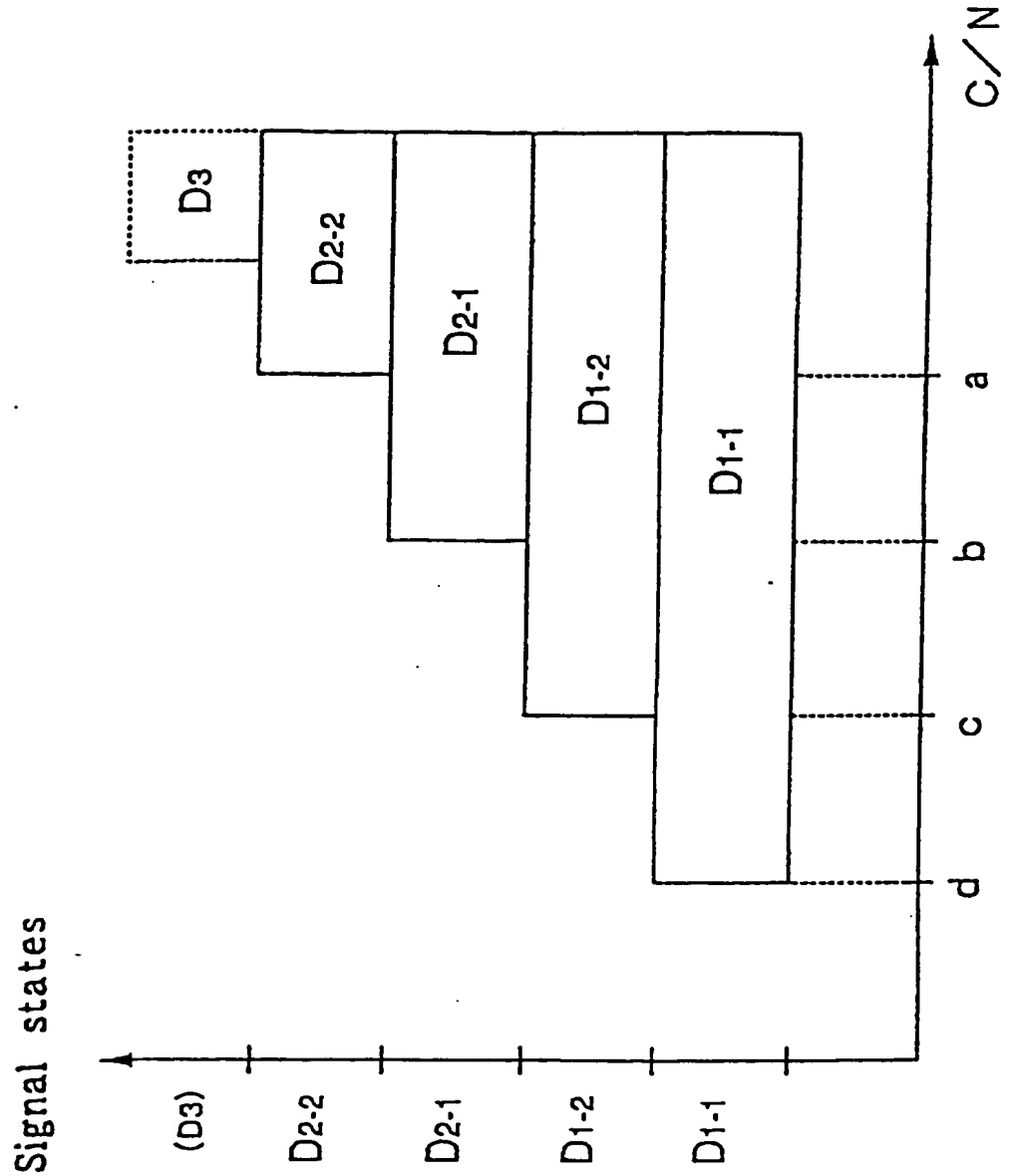


FIG. 85

FIG. 86

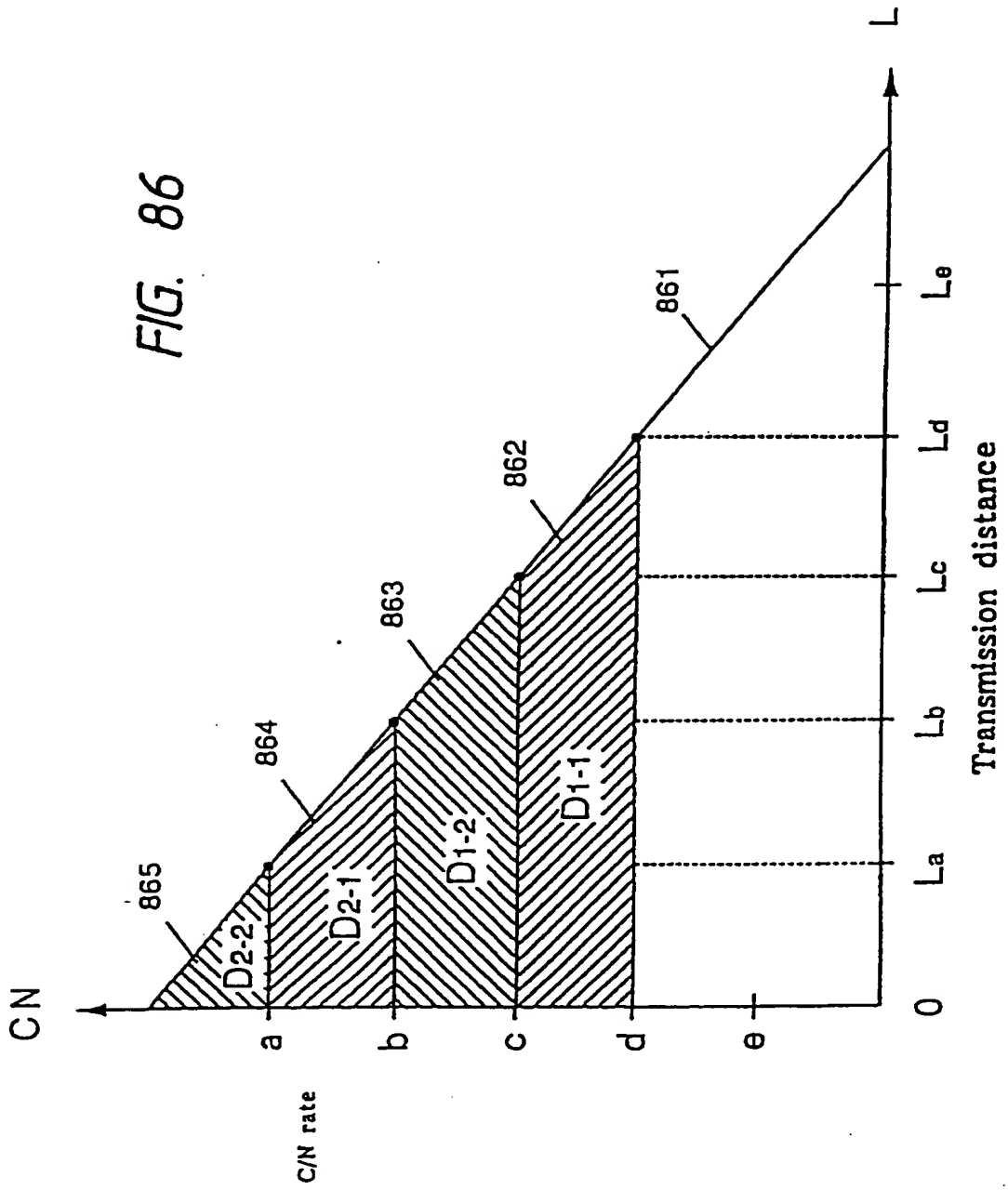
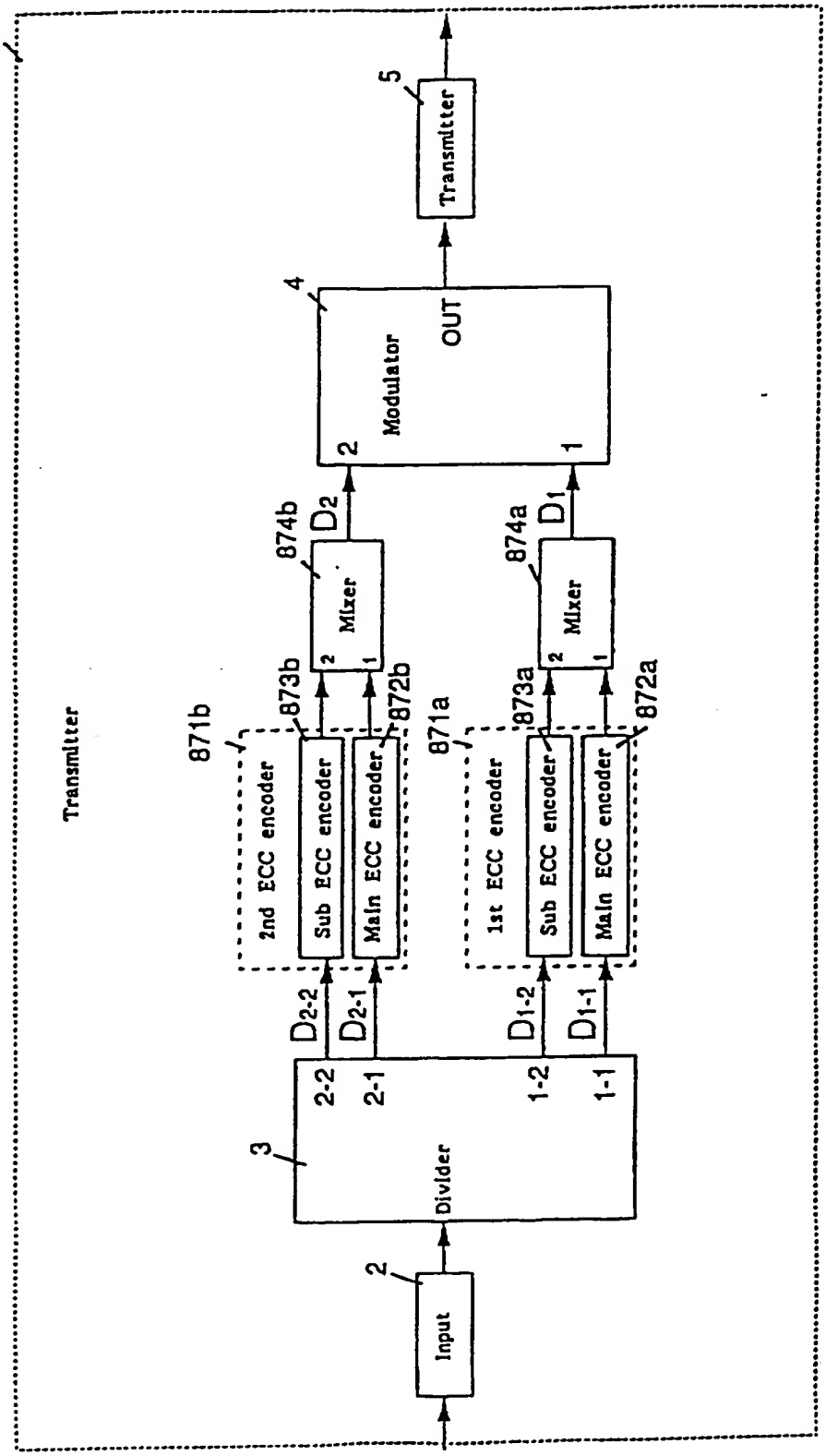

CN
L
C/N rate
Transmission distance
a
b
c
d
e
0
La
Lb
Lc
Ld
Le
861
862
863
864
865
D1-1
D1-2
D2-1
D2-2

FIG. 87


1
Transmitter
5
Transmitter
4
Modulator
OUT
2
1
874b
D2
874a
D1
Mixer
Mixer
873b
872b
871b
871a
873a
872a
2nd ECC encoder
Sub ECC encoder
Main ECC encoder
1st ECC encoder
Sub ECC encoder
Main ECC encoder
D2-2
D2-1
D1-2
D1-1
2-2
2-1
1-2
1-1
3
Divider
2
Input

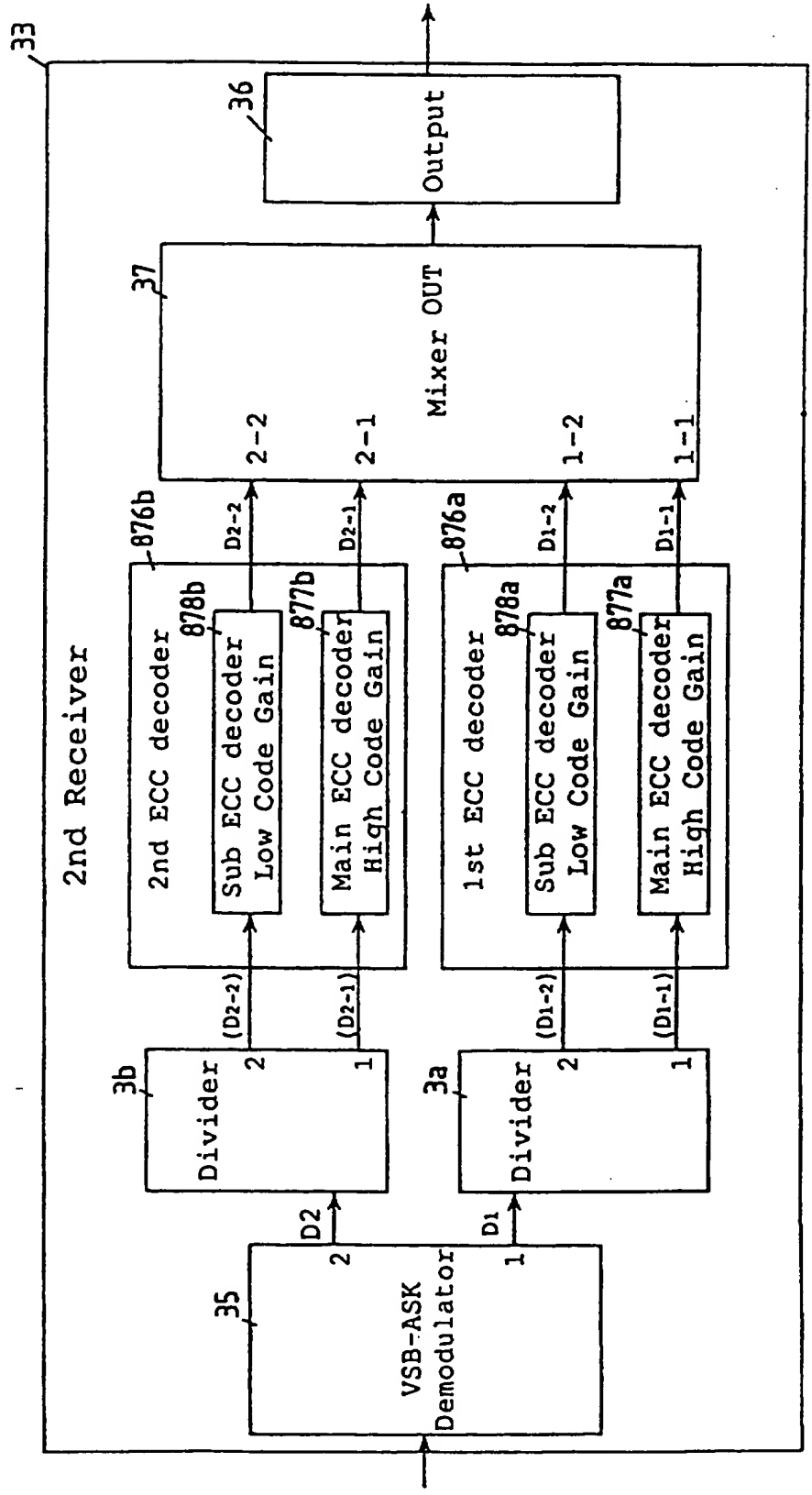

33
2nd Receiver
36
Output
37
Mixer OUT
2-2
2-1
1-2
1-1
876b
876a
D2-2
D2-1
D1-2
D1-1
2nd ECC decoder
1st ECC decoder
878b
877b
878a
877a
Sub ECC decoder Low Code Gain
Main ECC decoder High Code Gain
(D2-2)
(D2-1)
(D1-2)
(D1-1)
3b
3a
Divider
2
1
D2
D1
35
VSB-ASK Demodulator

FIG. 88

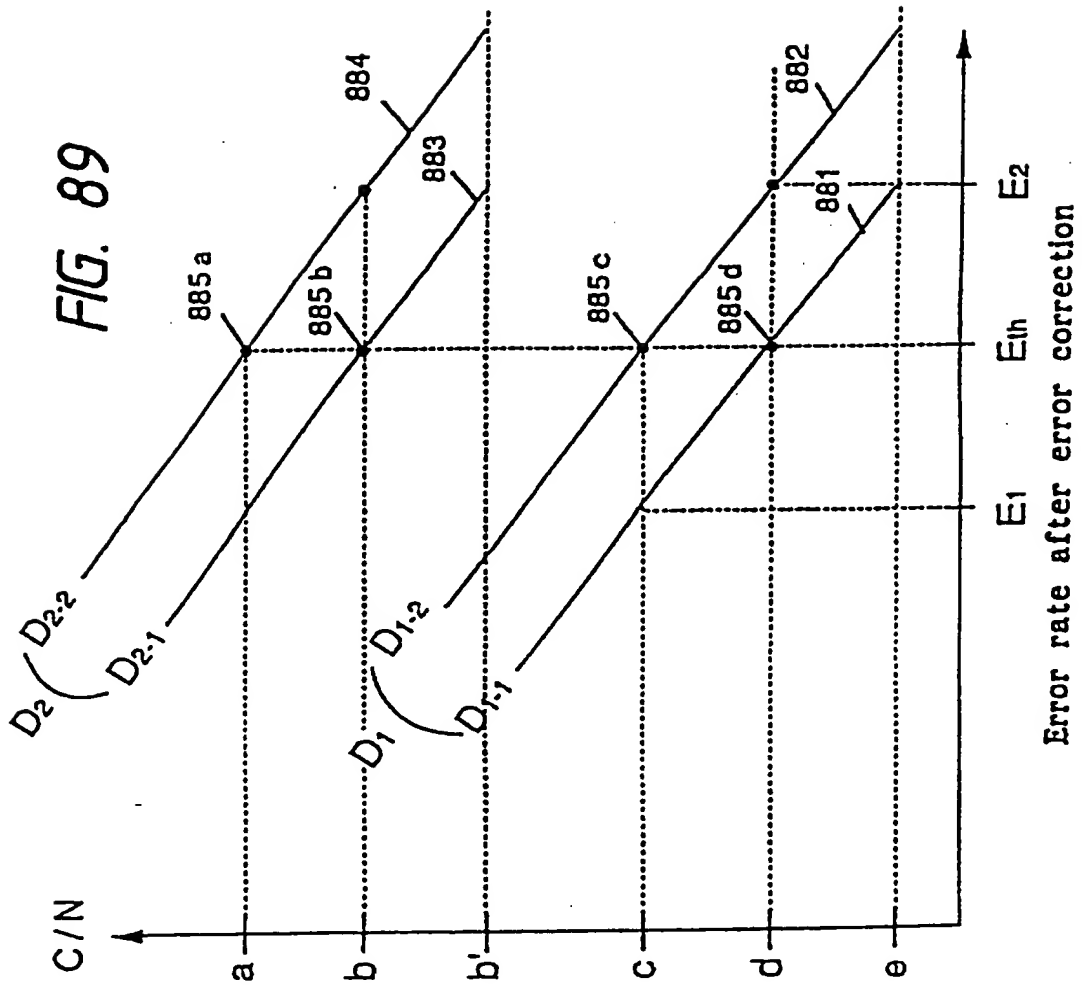

C/N
a
b
b'
c
d
e
D2
D2-2
D2-1
D1
D1-2
D1-1
884
883
882
881
885a
885b
885c
885d
E1
Eth
E2
Error rate after error correction

FIG. 89

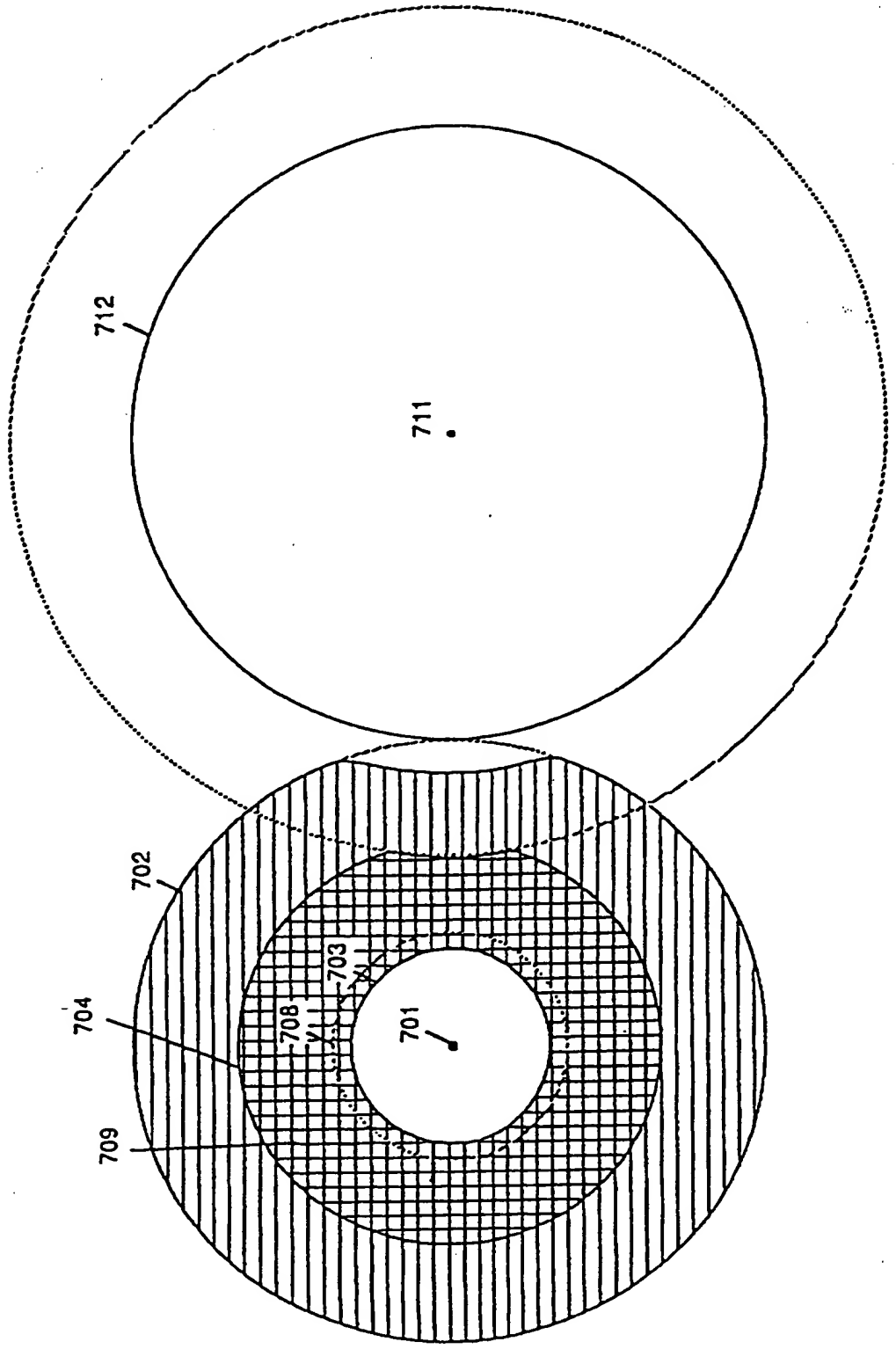


FIG. 90

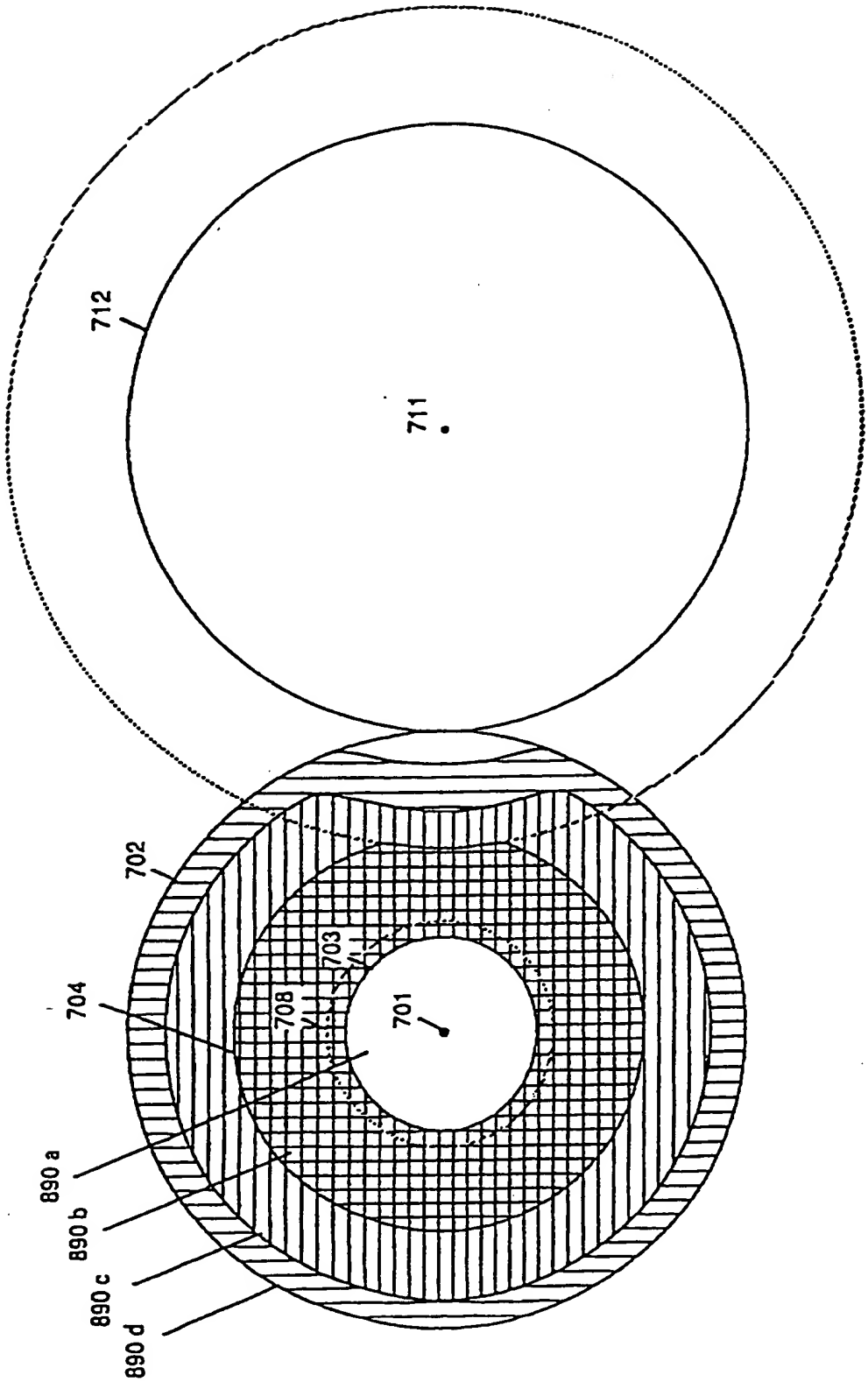
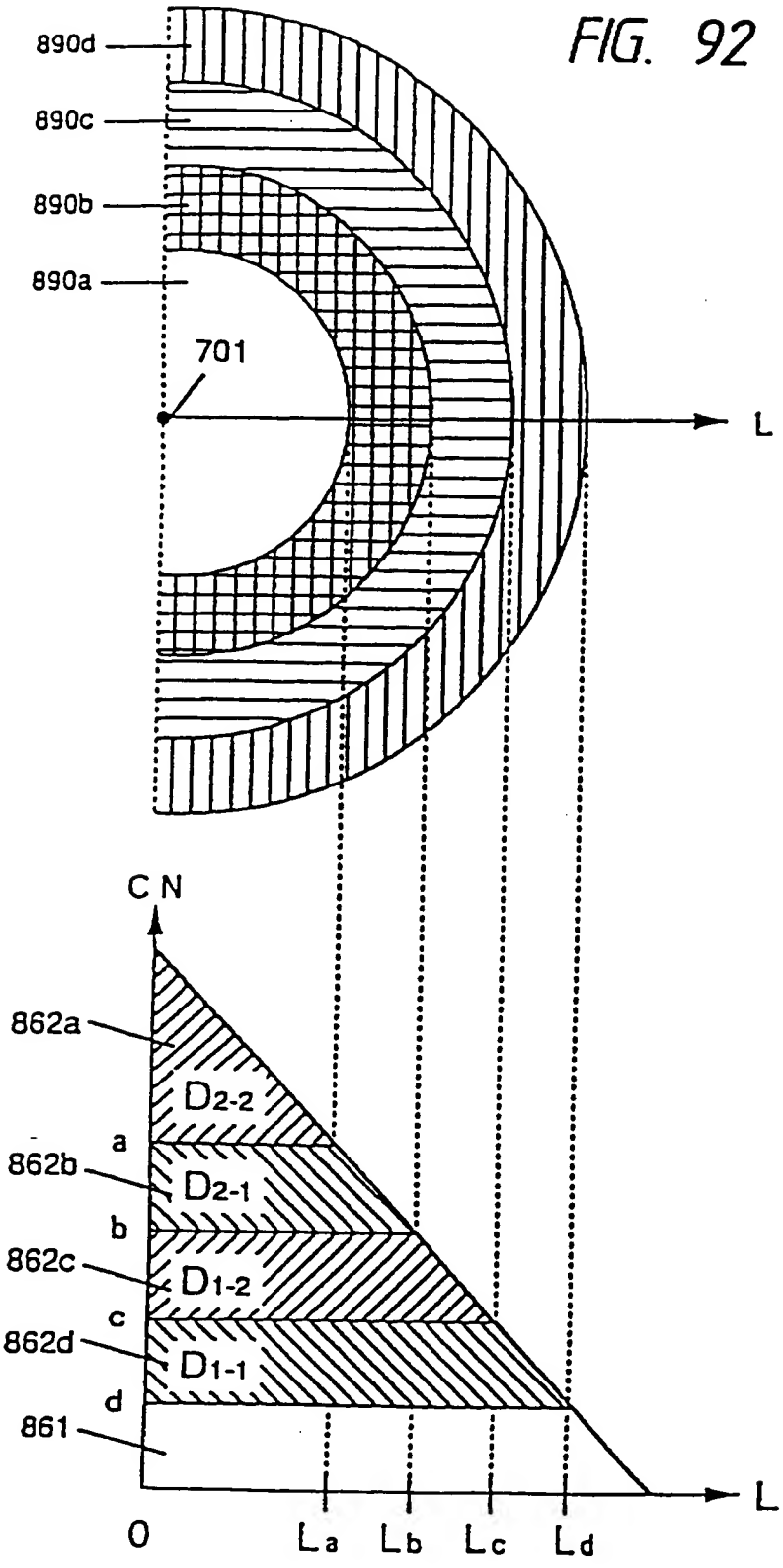


FIG. 91

FIG. 92


890d
890c
890b
890a
701
L
C N
862a
D2-2
a
862b
D2-1
b
862c
D1-2
c
862d
D1-1
d
861
L
0
La
Lb
Lc
Ld

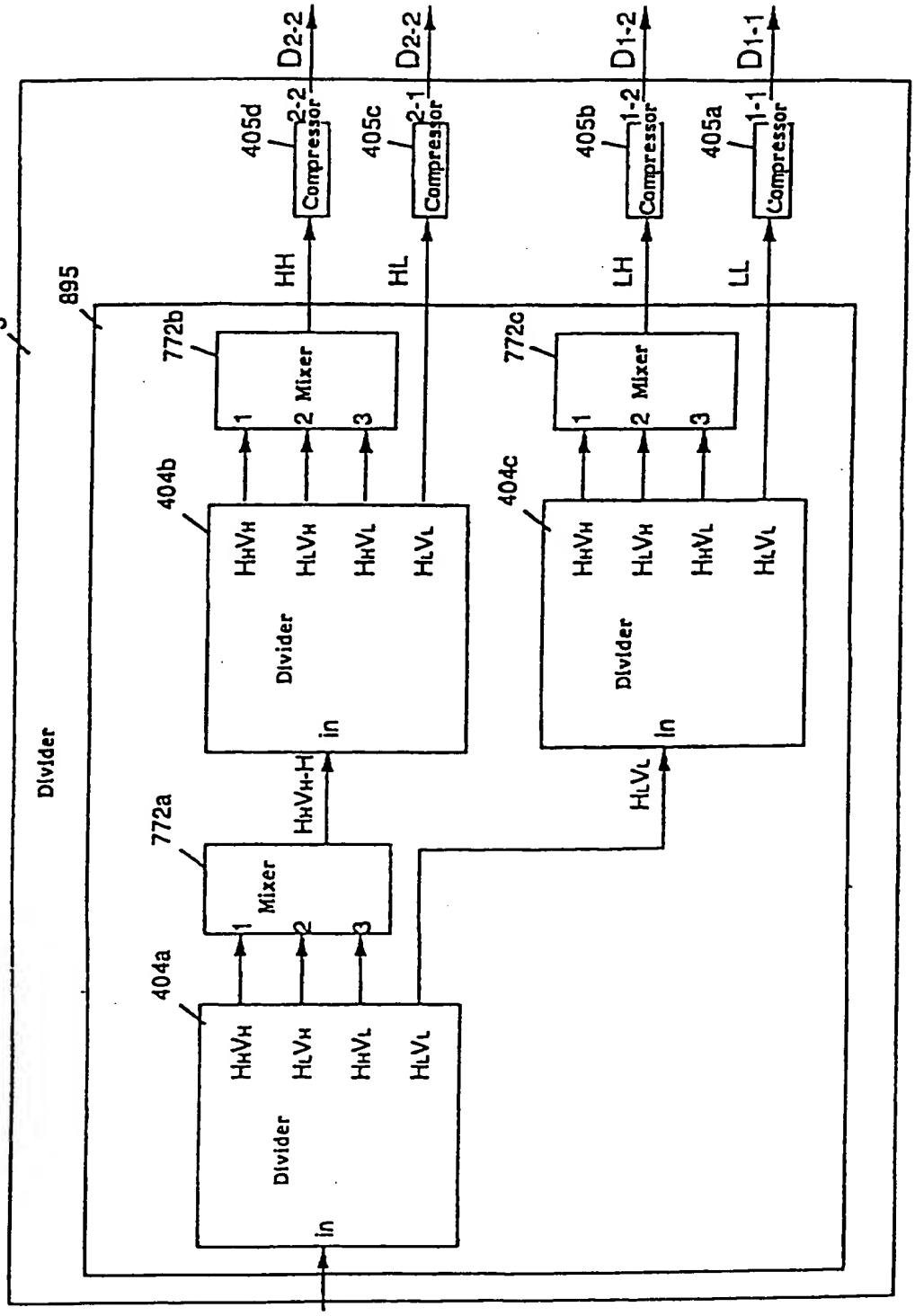

D2-2
D2-2
D1-2
D1-1
405d
2-2
Compressor
405c
2-1
Compressor
405b
1-2
Compressor
405a
1-1
Compressor
HH
HL
LH
LL
895
3
772b
772c
1
2 Mixer
3
404b
404c
HHVH
HLVH
HHVL
HLVL
Divider
in
HHVH-H
HLVL
772a
Mixer
404a
Divider

FIG. 93

FIG. 94

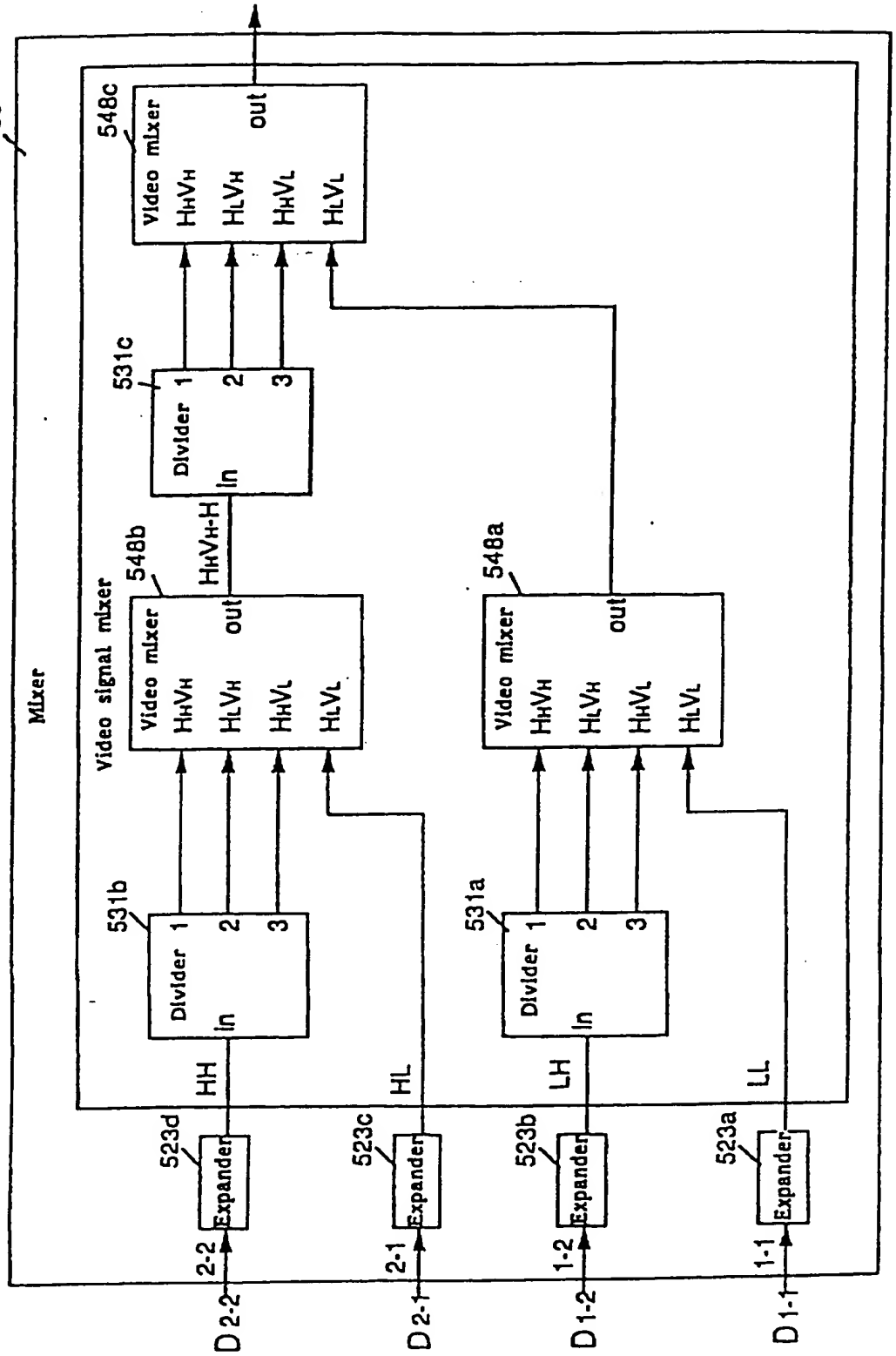
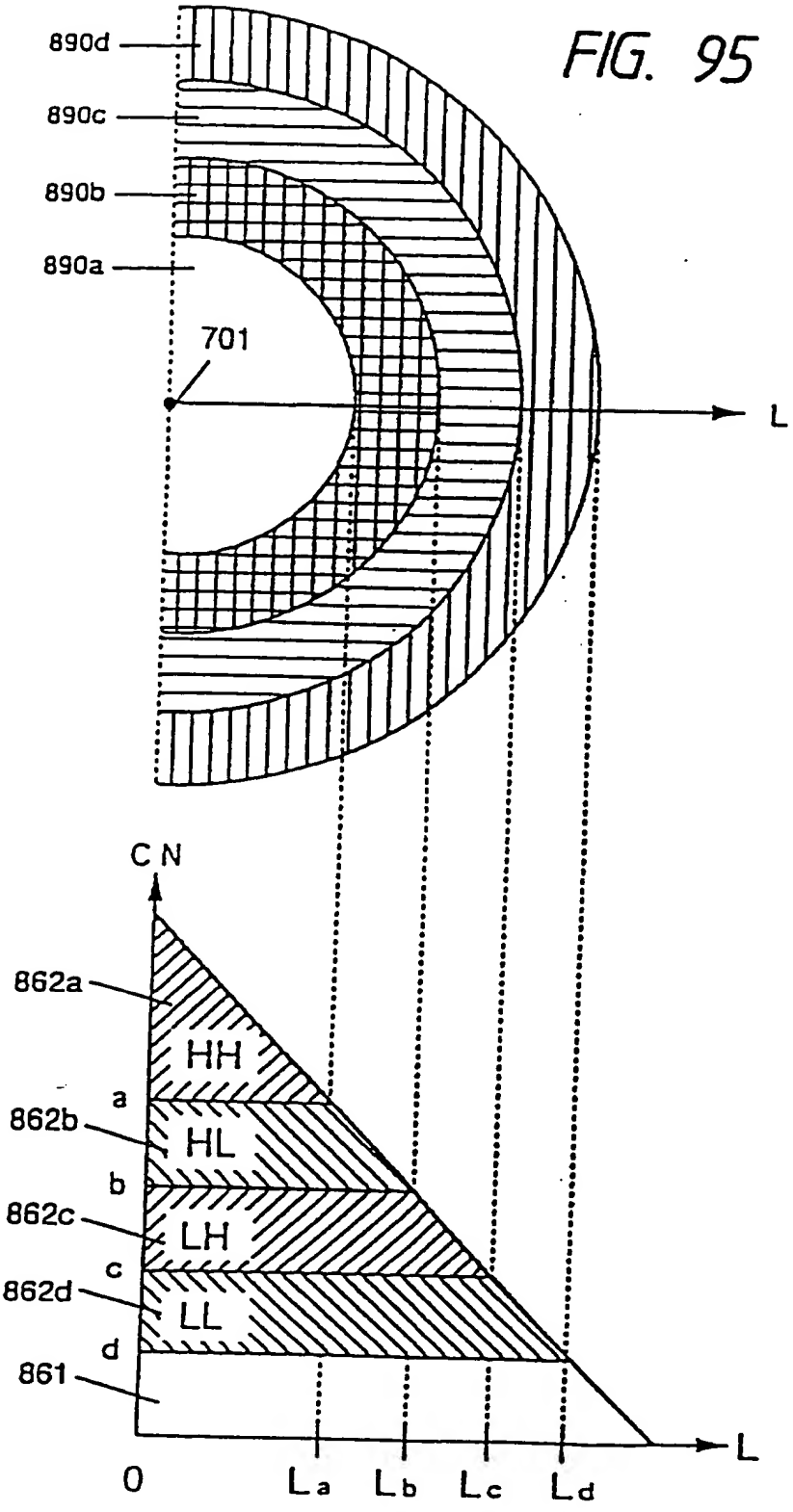

33
Mixer
Video signal mixer
548c
Video mixer
out
HHVH
HLVH
HHVL
HLVL
531c
Divider
1
2
3
In
HHVH-H
548b
548a
531b
531a
HH
HL
LH
LL
523d
523c
523b
523a
Expander
2-2
2-1
1-2
1-1
D2-2
D2-1
D1-2
D1-1

FIG. 95


890d
890c
890b
890a
701
L
C N
862a
HH
a
862b
HL
b
862c
LH
c
862d
LL
d
861
L
0
La
Lb
Lc
Ld

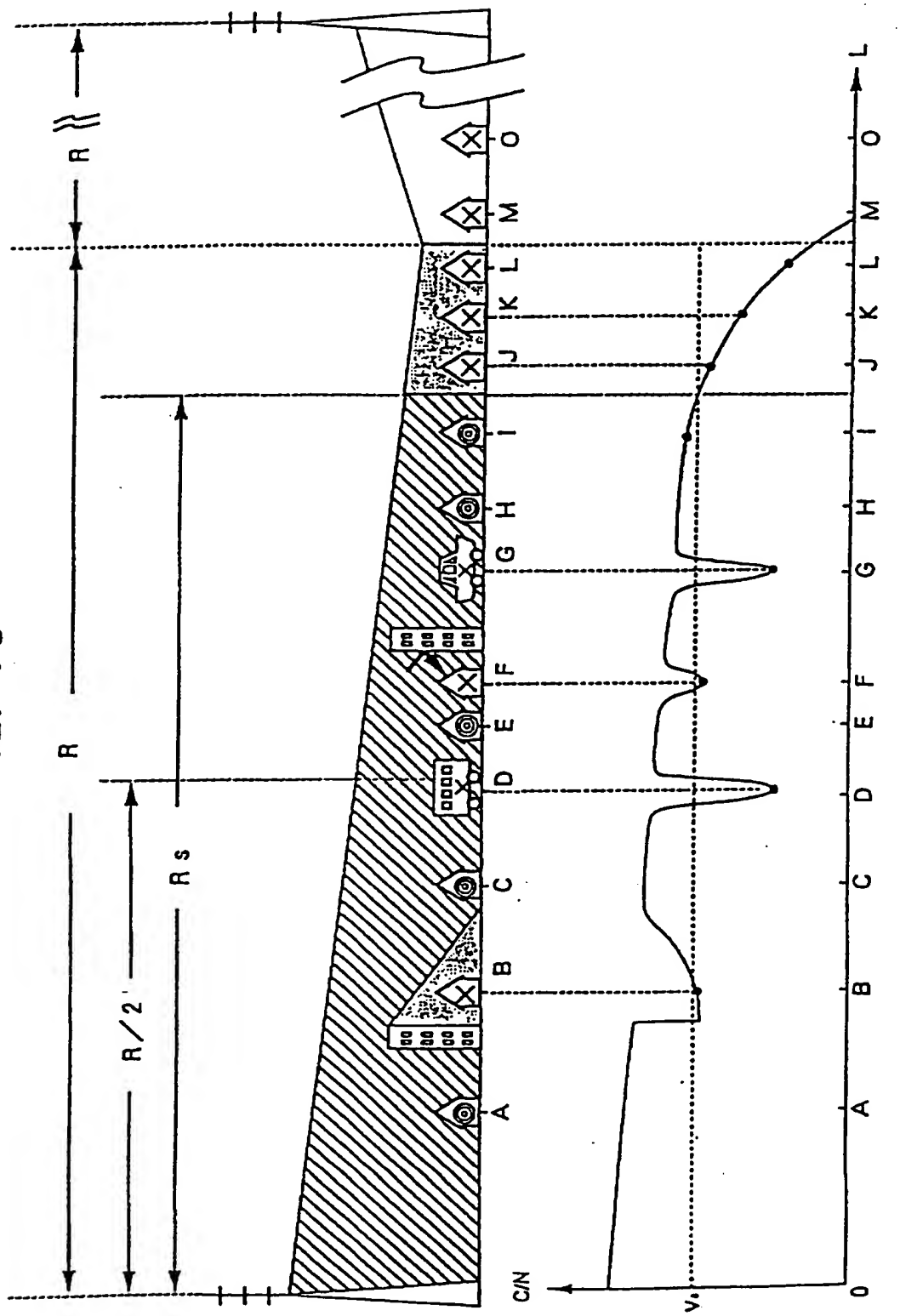


FIG. 96

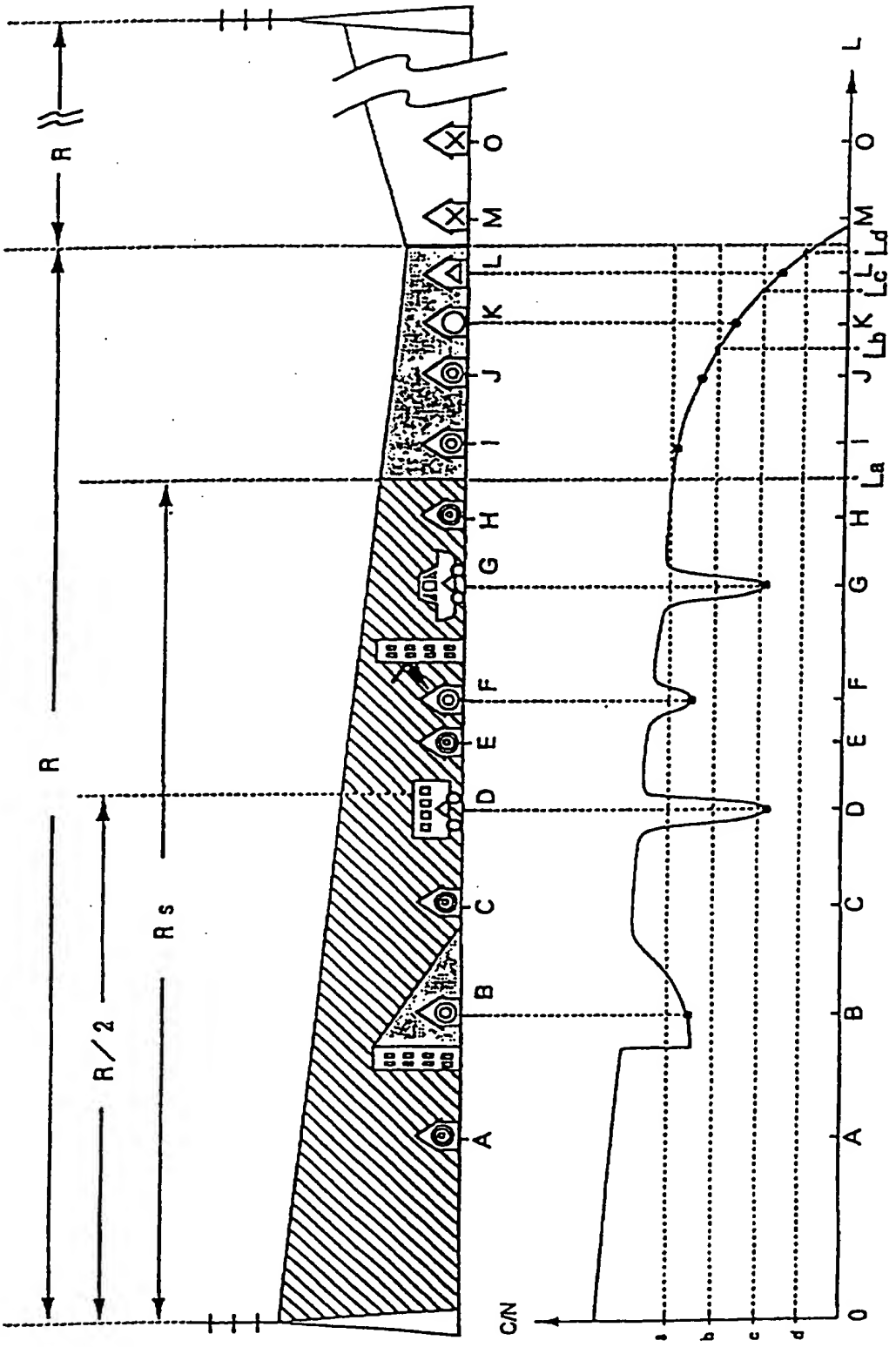
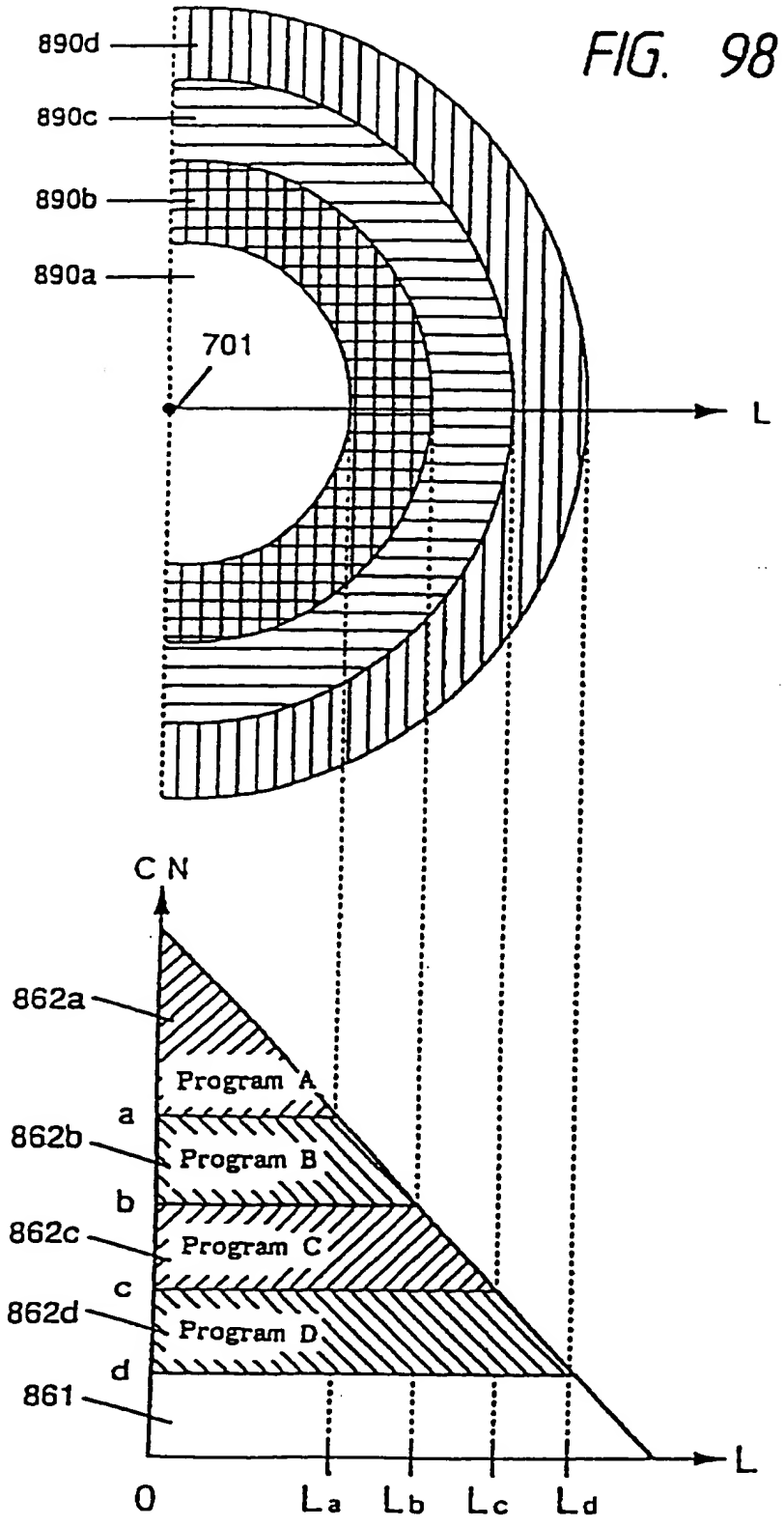


FIG. 97

FIG. 98


890d
890c
890b
890a
701
L
C N
862a
Program A
a
862b
Program B
b
862c
Program C
c
862d
Program D
d
861
L
0
La
Lb
Lc
Ld

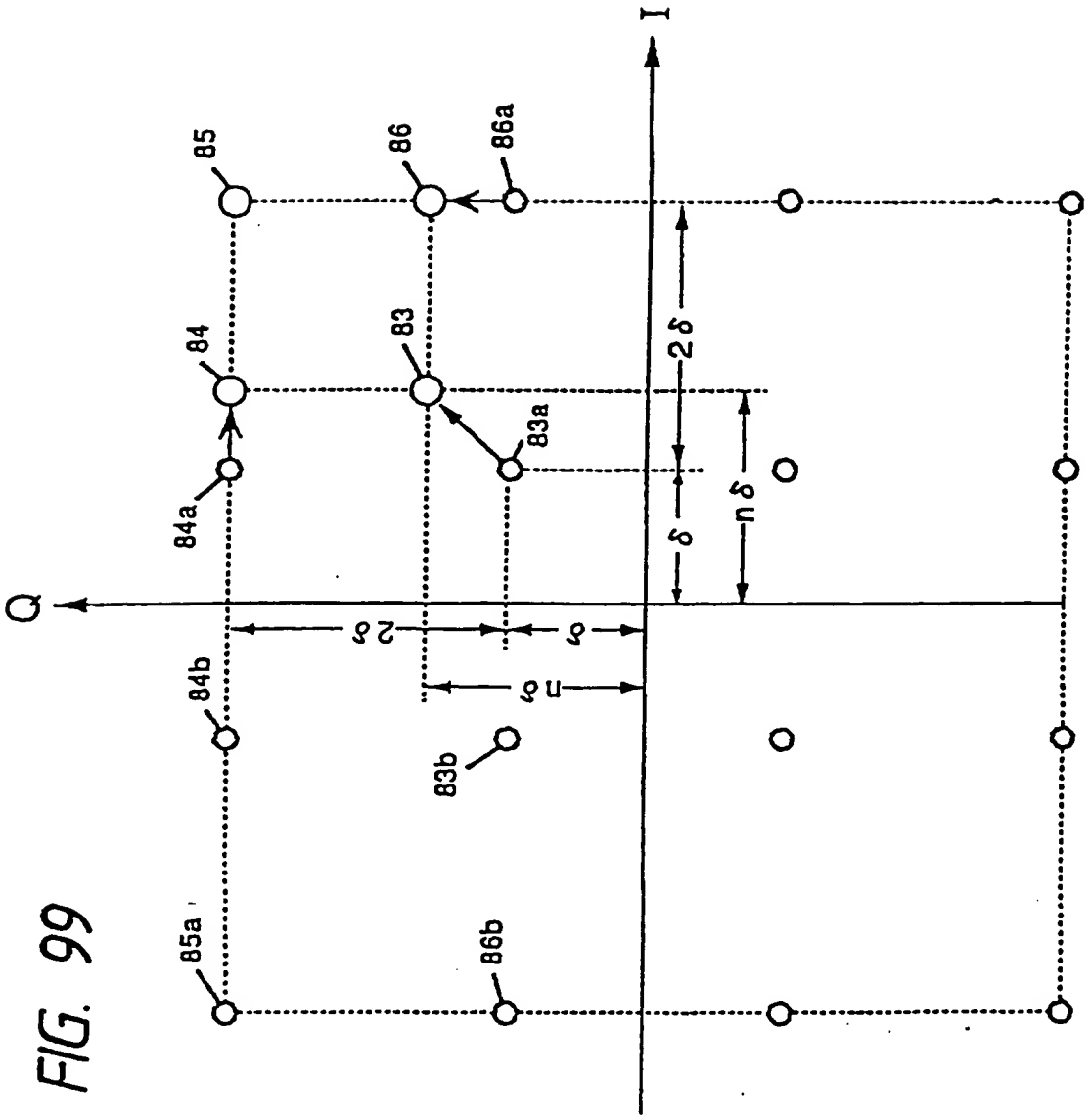


FIG. 99

FIG. 100

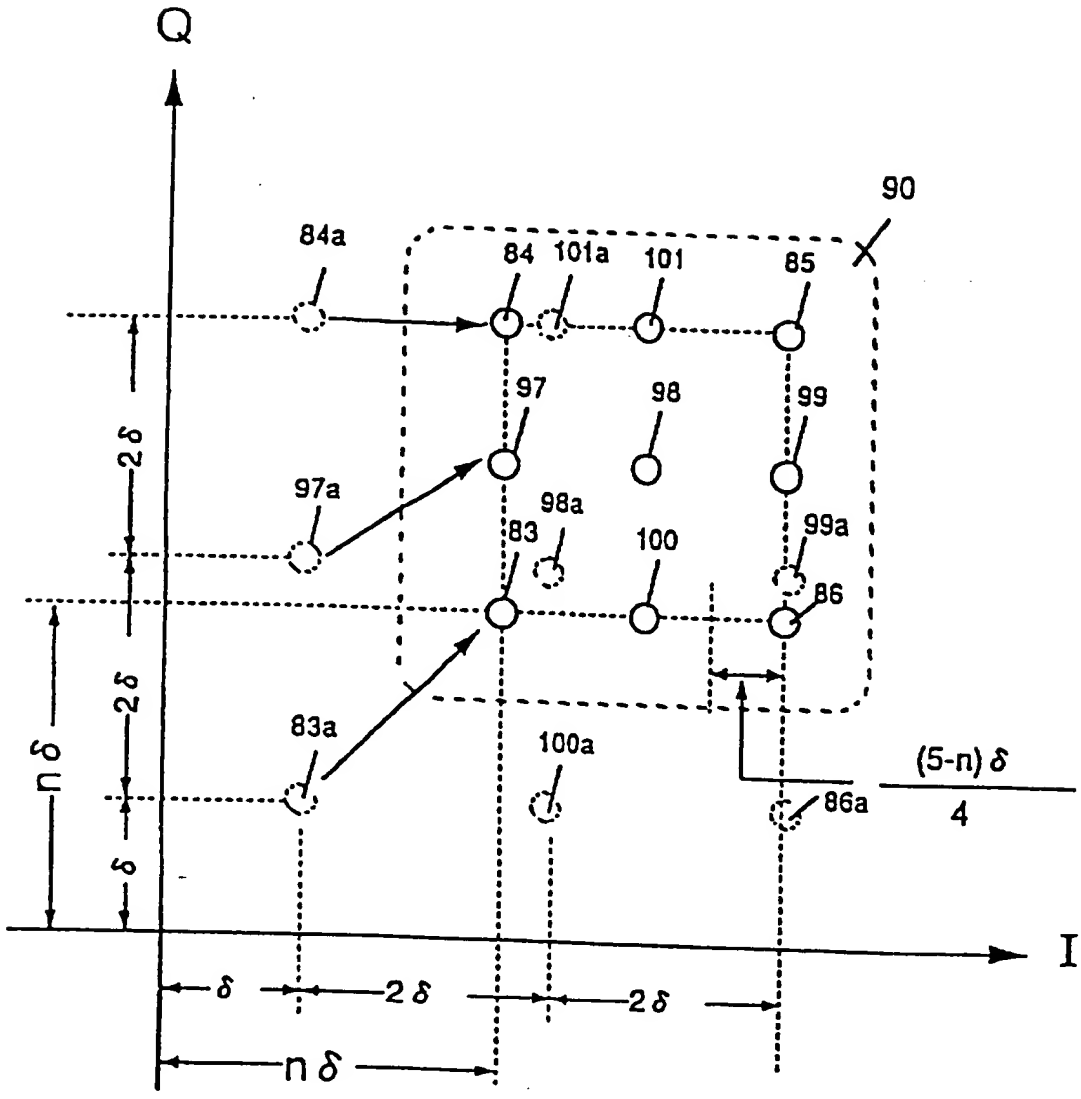

Q
I
90
84a
84
101a
101
85
97
98
99
97a
98a
83
100
99a
86
83a
100a
86a
(5-n) δ
4
2δ
2δ
nδ
δ
δ
2δ
2δ
nδ

FIG. 101

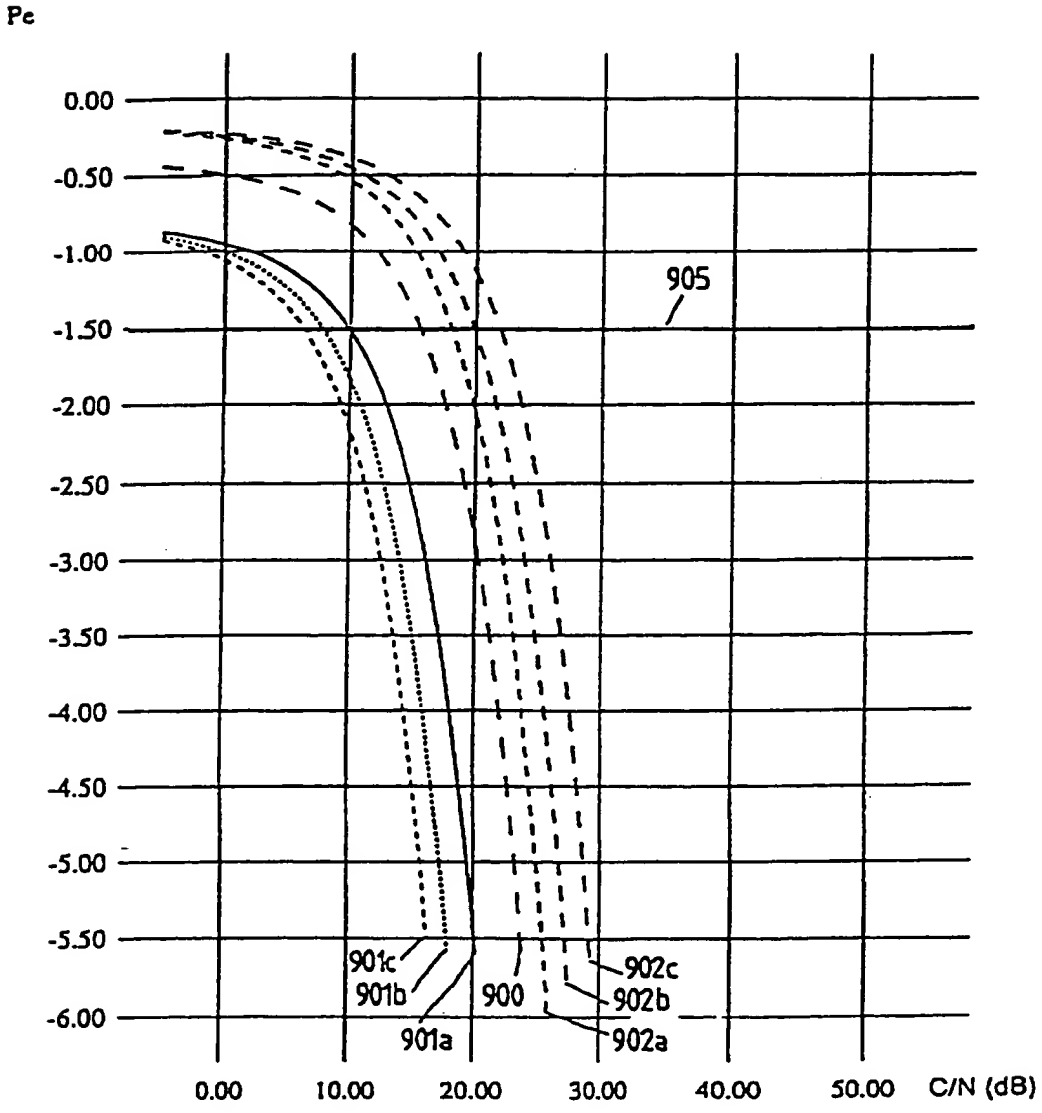

Pe
0.00
-0.50
-1.00
-1.50
-2.00
-2.50
-3.00
-3.50
-4.00
-4.50
-5.00
-5.50
-6.00
905
901c
901b
901a
900
902c
902b
902a
0.00
10.00
20.00
30.00
40.00
50.00
C/N (dB)

FIG. 102

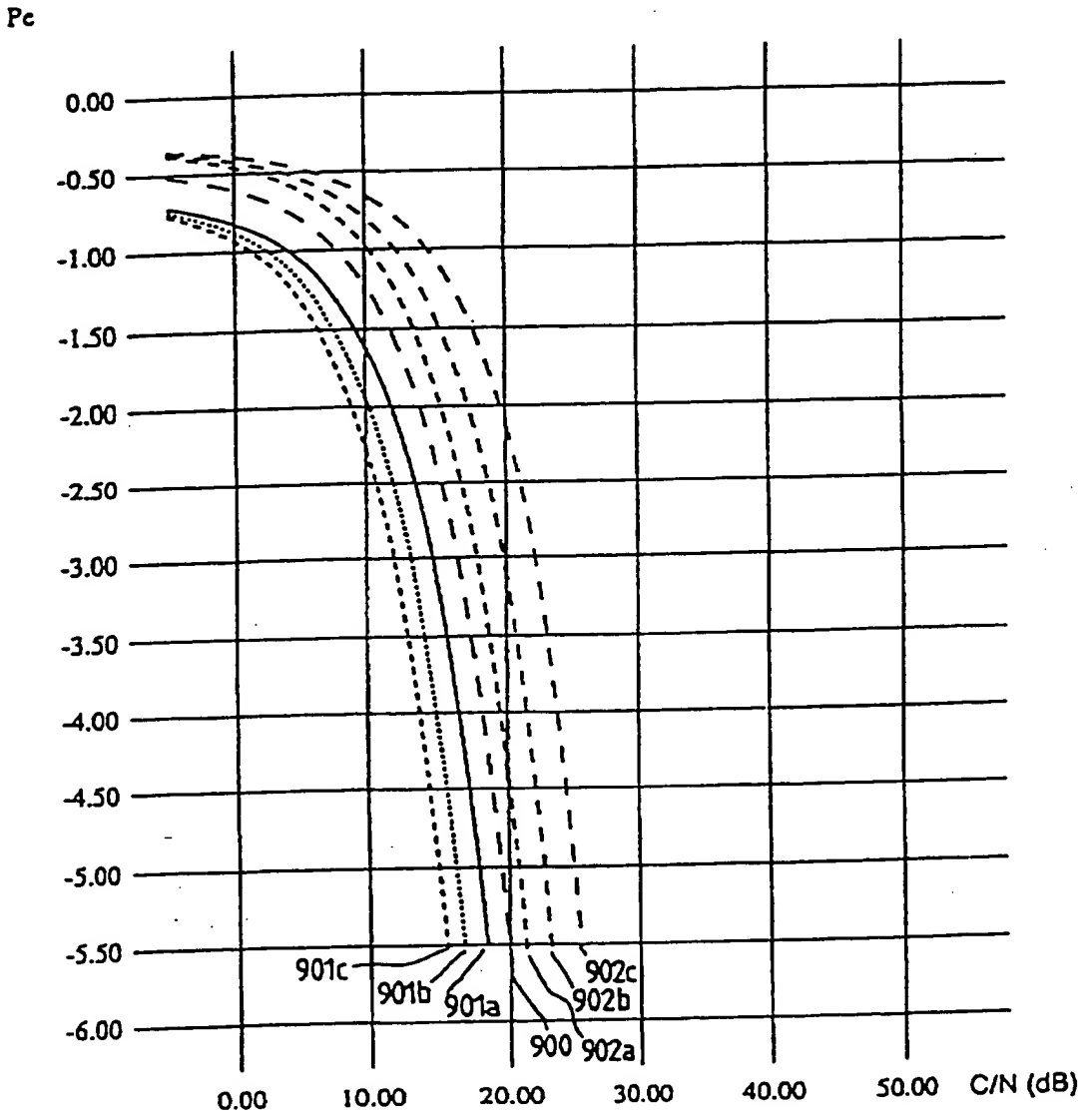

Pe
0.00
-0.50
-1.00
-1.50
-2.00
-2.50
-3.00
-3.50
-4.00
-4.50
-5.00
-5.50
-6.00
901c
901b
901a
900
902a
902b
902c
0.00
10.00
20.00
30.00
40.00
50.00
C/N (dB)

FIG. 103

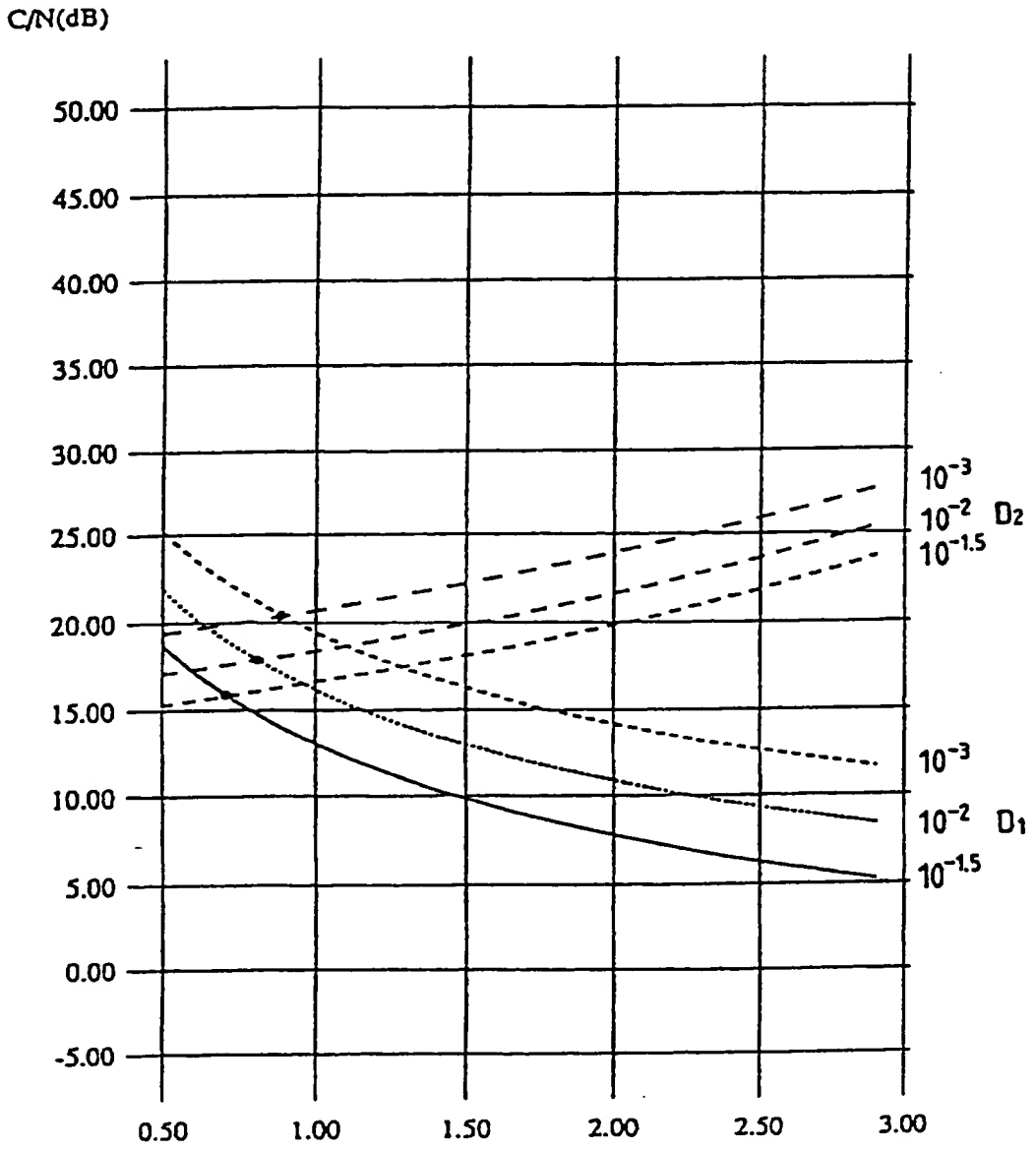
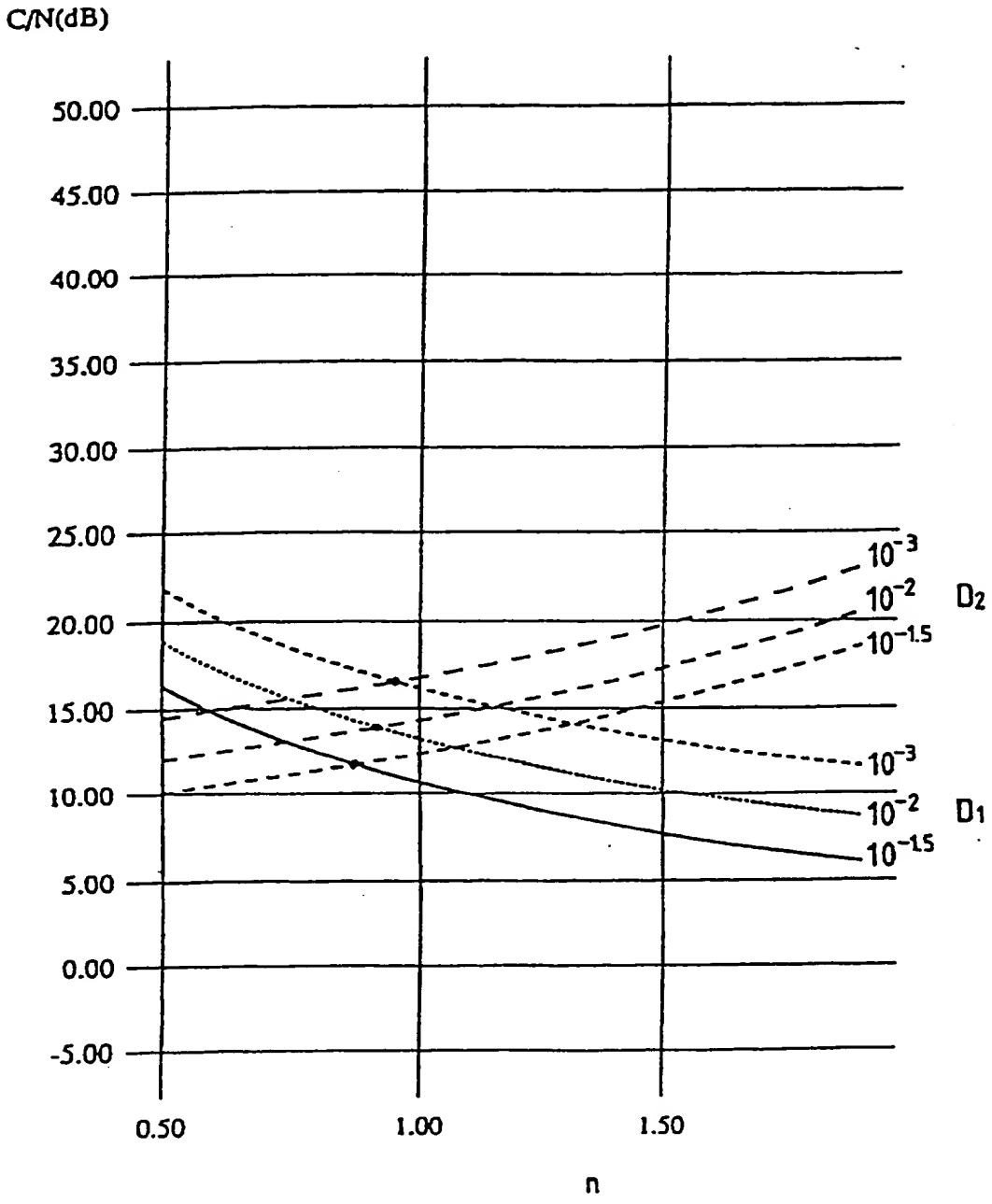

C/N(dB)
50.00
45.00
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
-5.00
0.50
1.00
1.50
2.00
2.50
3.00
10^{-3}
10^{-2}
$10^{-1.5}$
D2
10^{-3}
10^{-2}
$10^{-1.5}$
D1

FIG. 104


C/N(dB)
50.00
45.00
40.00
35.00
30.00
25.00
20.00
15.00
10.00
5.00
0.00
-5.00
0.50
1.00
1.50
n
10^{-3}
10^{-2}
$10^{-1.5}$
D_2
10^{-3}
10^{-2}
$10^{-1.5}$
D_1

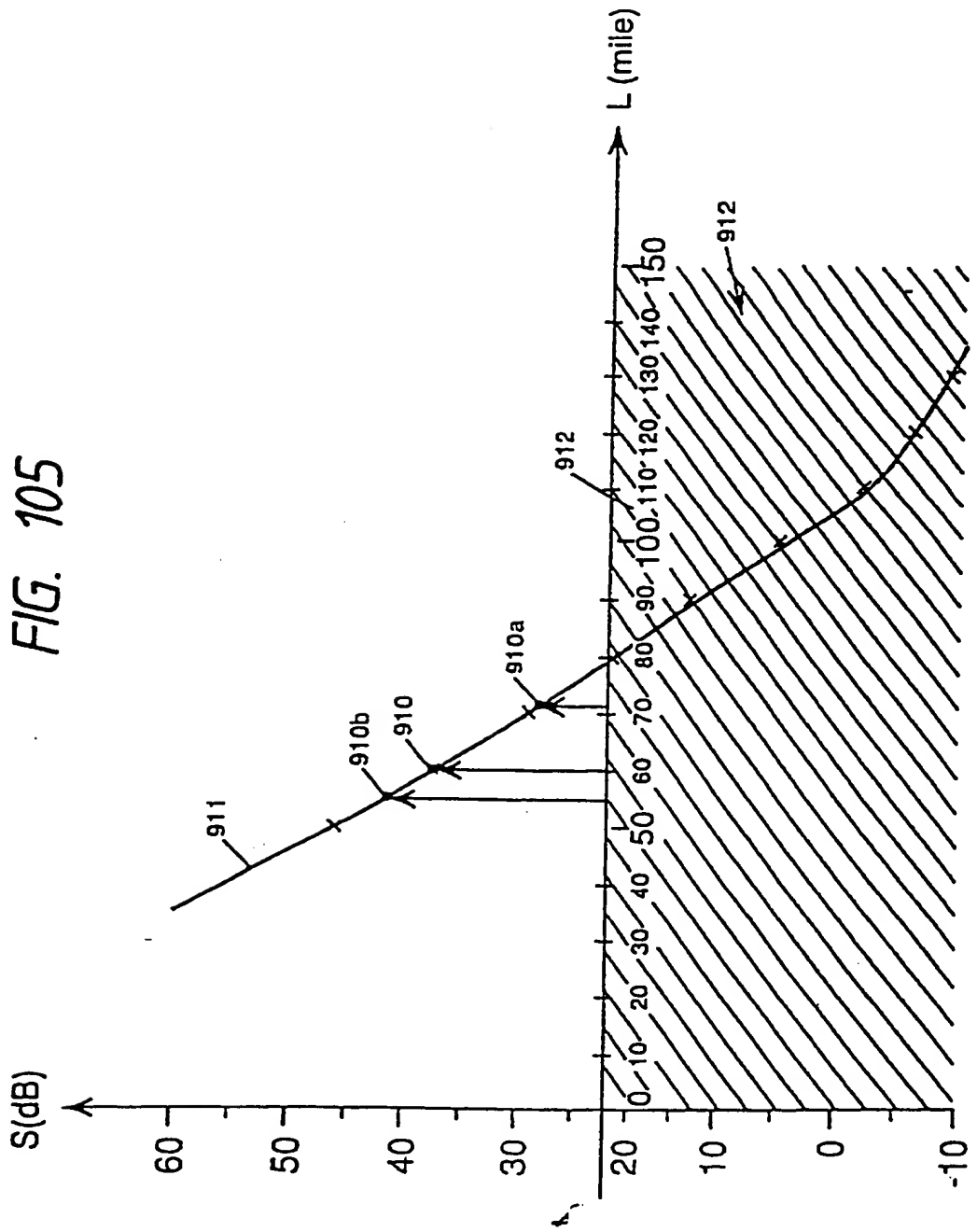

S(dB)
60
50
40
30
20
10
0
-10
L (mile)
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
911
910b
910
910a
912
912

FIG. 105

FIG. 106

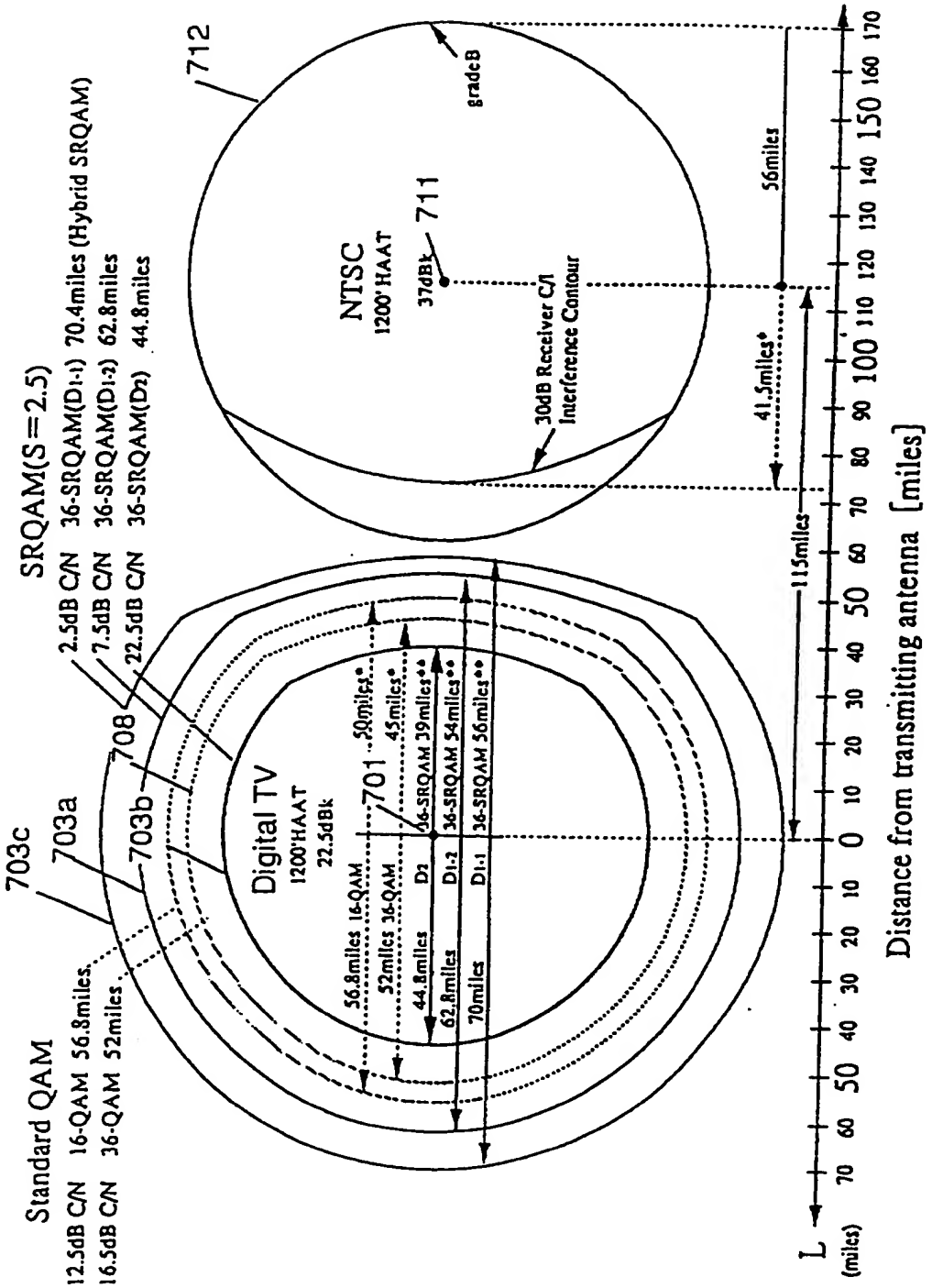

SRQAM(S=2.5)
2.5dB C/N 36-SRQAM(D1-1) 70.4miles (Hybrid SRQAM)
7.5dB C/N 36-SRQAM(D1-2) 62.8miles
22.5dB C/N 36-SRQAM(D2) 44.8miles
Standard QAM
12.5dB C/N 16-QAM 56.8miles
16.5dB C/N 36-QAM 52miles
703c
703a
703b
708
712
711
701
Digital TV
1200'HAAT
22.5dBk
NTSC
1200'HAAT
37dBk
grade B
30dB Receiver C/I
Interference Contour
56.8miles 16-QAM
52miles 36-QAM
44.8miles
62.8miles
70miles
D2
D1-2
D1-1
50miles*
45miles*
36-SRQAM 39miles**
36-SRQAM 54miles**
36-SRQAM 56miles**
56miles
41.5miles*
115miles
L (miles)
Distance from transmitting antenna [miles]

FIG. 107

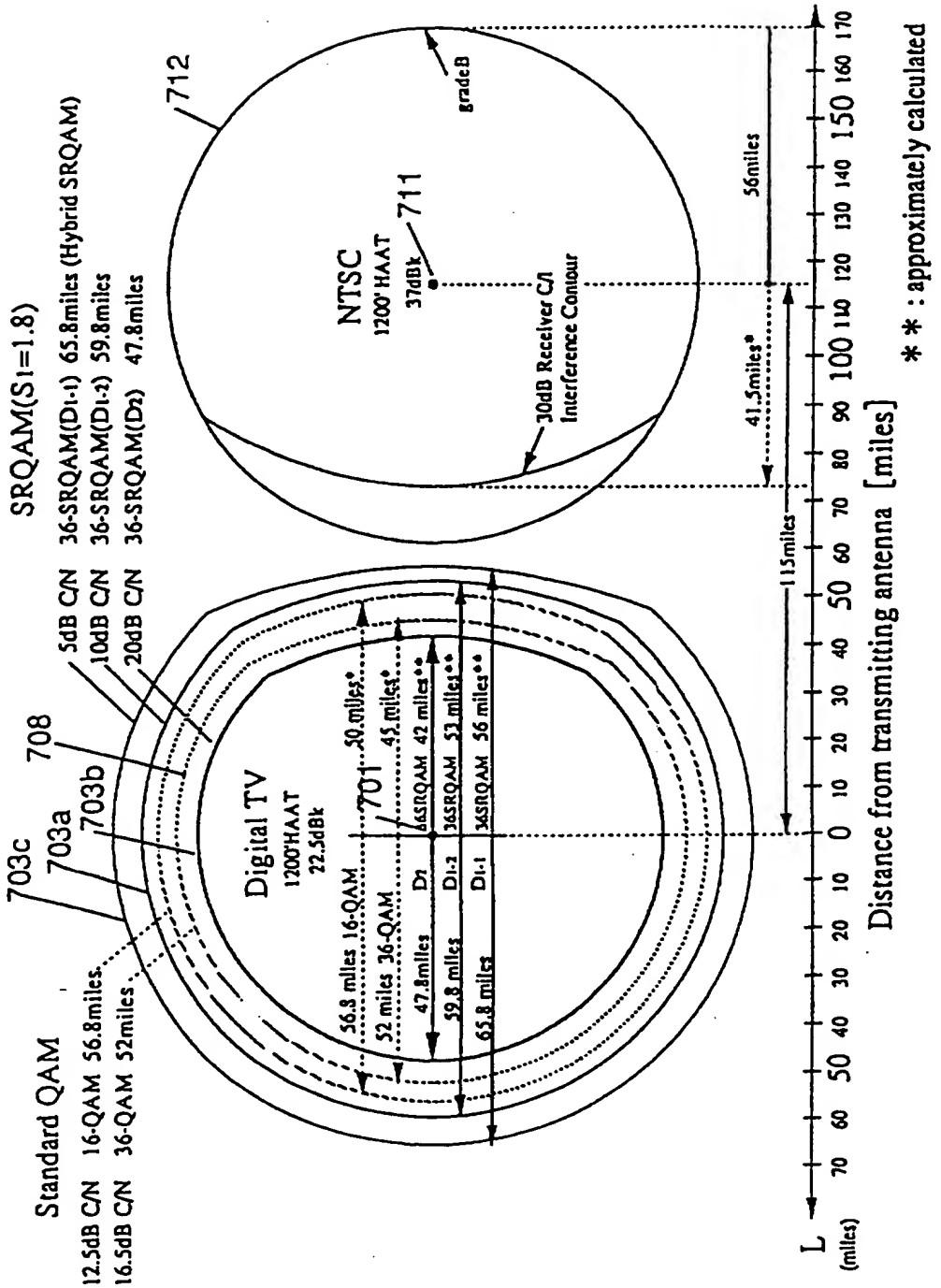

SRQAM(S1=1.8)
5dB C/N 36-SRQAM(D1-1) 65.8miles (Hybrid SRQAM)
10dB C/N 36-SRQAM(D1-2) 59.8miles
20dB C/N 36-SRQAM(D2) 47.8miles
708
703b
703a
703c
712
711
NTSC
1200' HAAT
37dBk
grade B
30dB Receiver C/I Interference Contour
56miles
41.5miles*
115miles
Digital TV
1200'HAAT
22.5dBk
701
50 miles*
45 miles*
64SRQAM 42 miles**
36SRQAM 53 miles**
36SRQAM 56 miles**
36.8 miles 16-QAM
52 miles 36-QAM
47.8miles
59.8 miles
65.8 miles
D2
D1-2
D1-1
Standard QAM
12.5dB C/N 16-QAM 56.8miles
16.5dB C/N 36-QAM 52miles
L (miles)
70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170
Distance from transmitting antenna [miles]
* * : approximately calculated

FIG. 108(a)

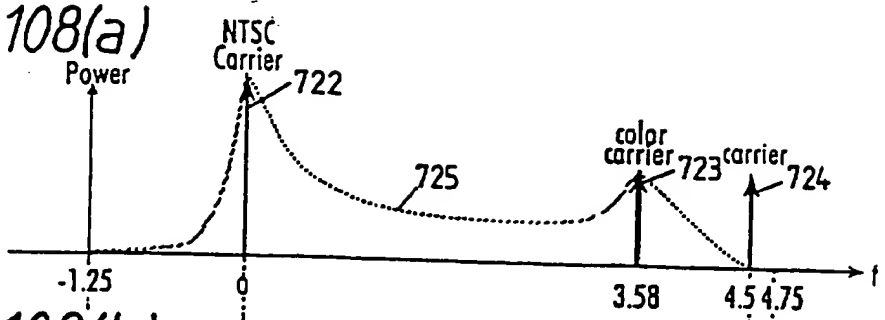


FIG. 108(b)

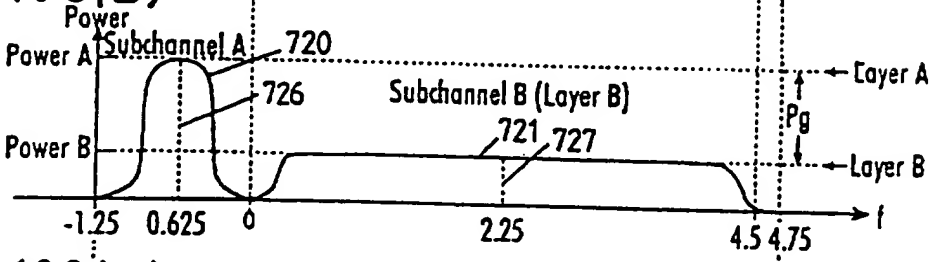


FIG. 108(c)

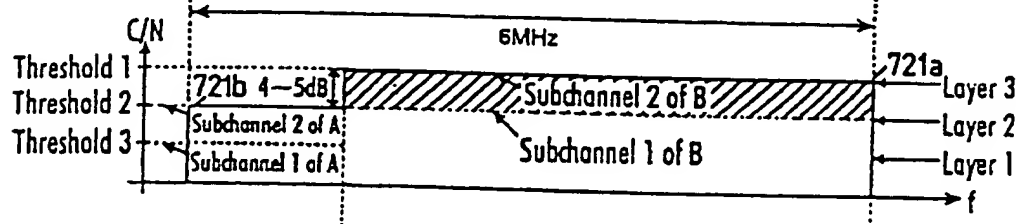


FIG. 108(d)

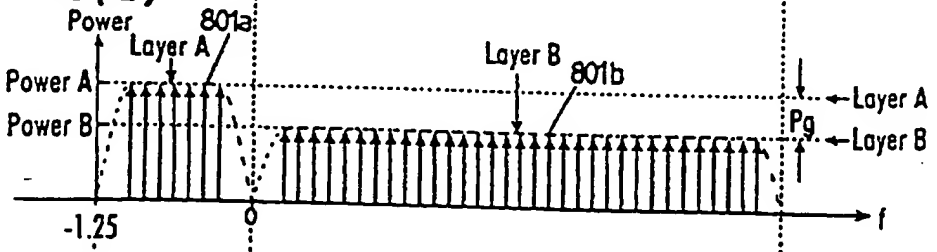


FIG. 108(e)

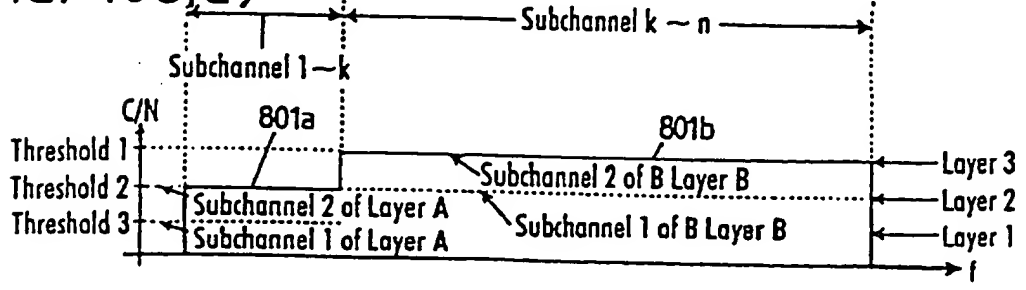
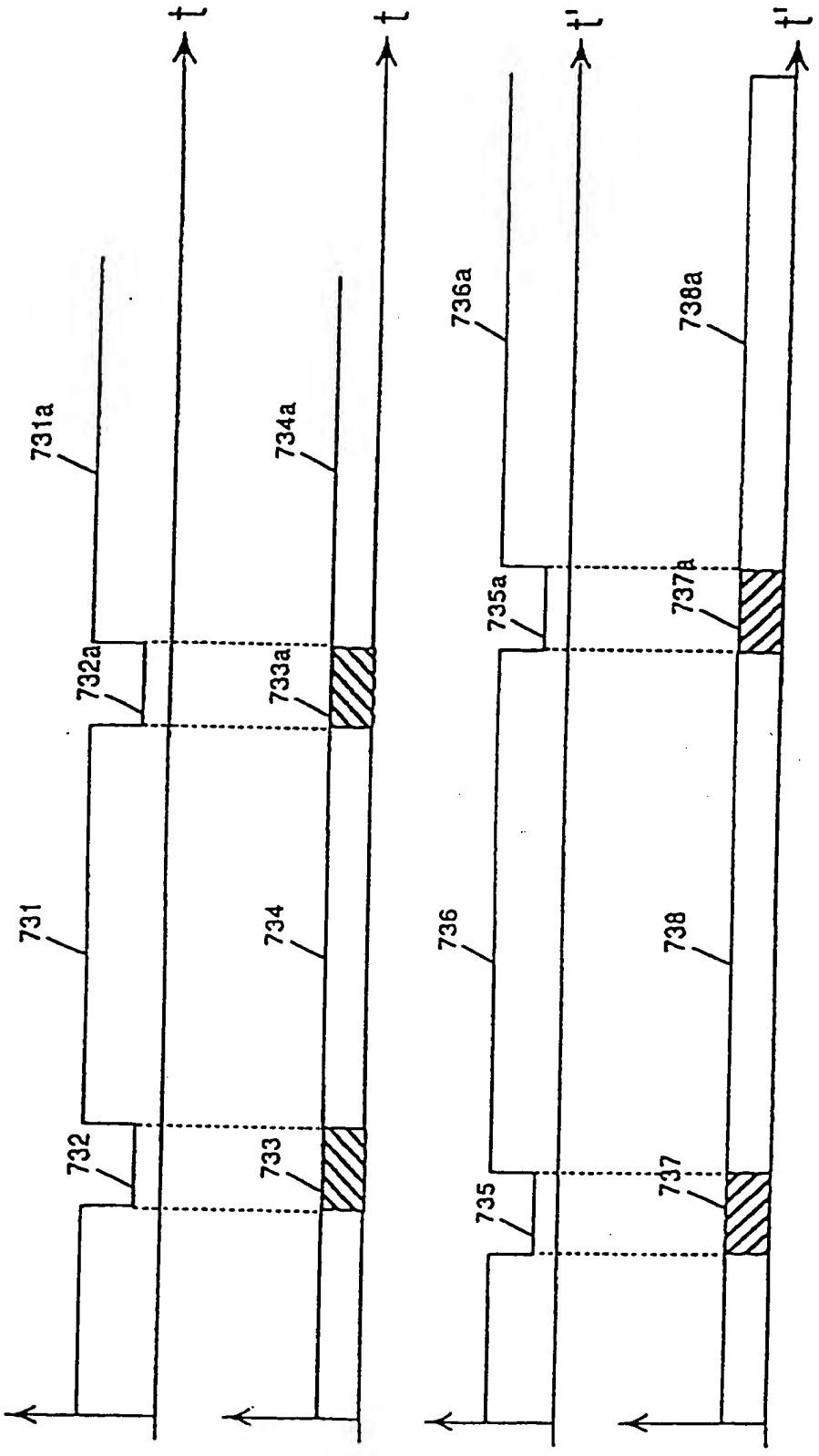


FIG. 109


t
t'
731a
734a
736a
738a
732a
733a
735a
737a
731
734
736
738
732
733
735
737

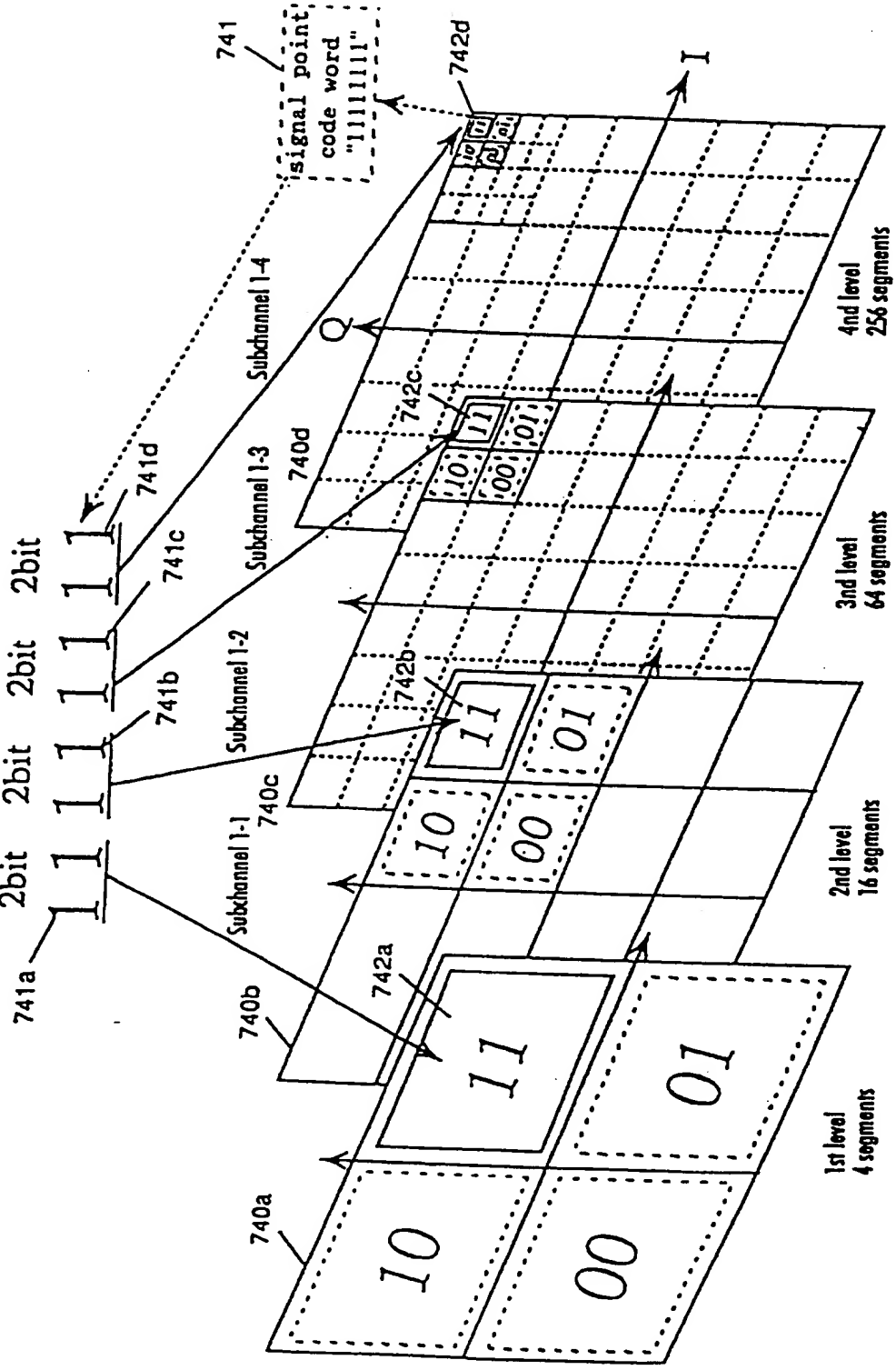

741
signal point
code word
"11111111"
742d
I
Q
Subchannel 1-4
Subchannel 1-3
Subchannel 1-2
Subchannel 1-1
741d
741c
741b
741a
8bit
2bit 2bit 2bit 2bit
740d
740c
740b
740a
742c
742b
742a
4nd level
256 segments
3nd level
64 segments
2nd level
16 segments
1st level
4 segments
11
10
01
00

FIG. 110

FIG. 111

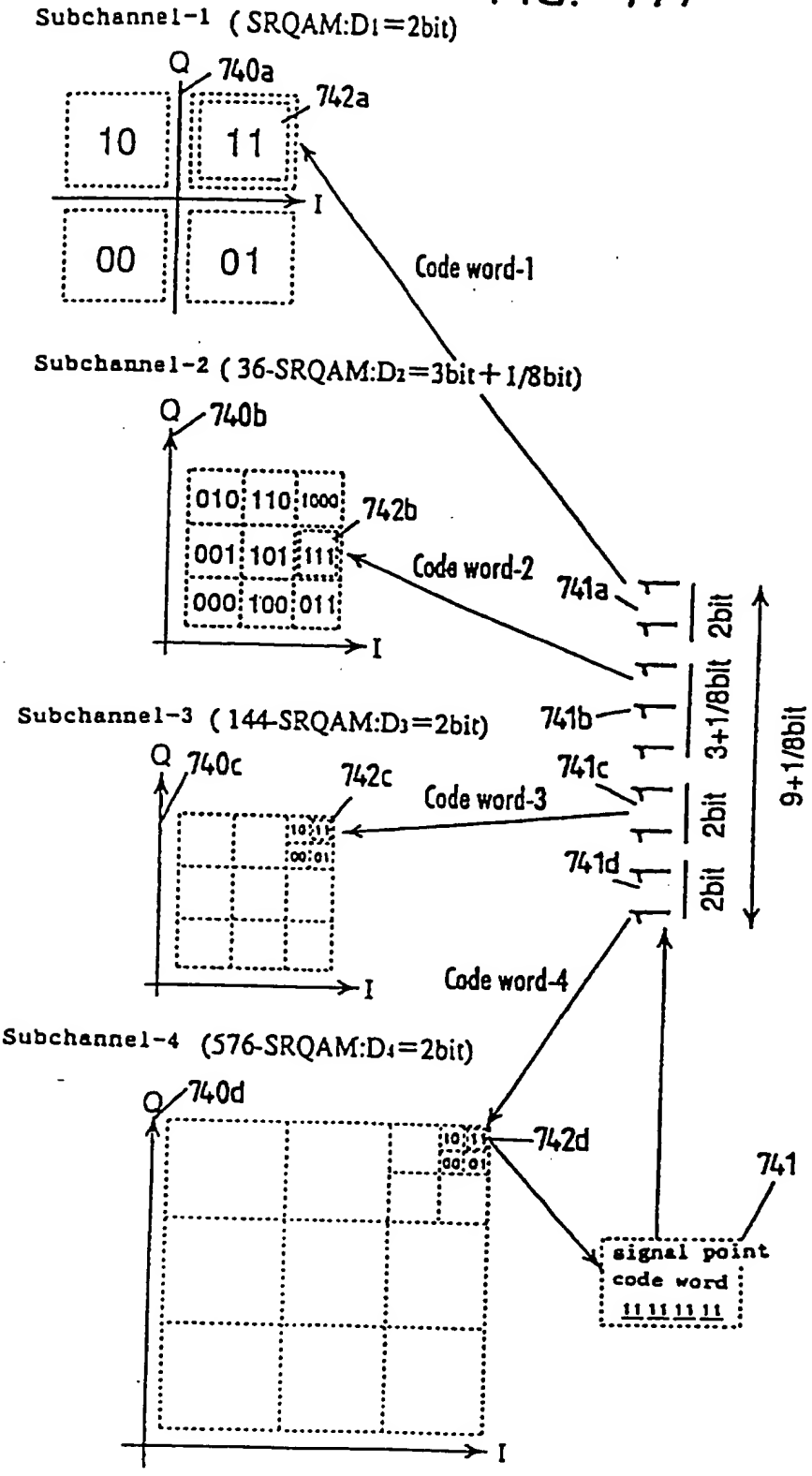

Subchannel-1 (SRQAM:D1=2bit)
Q
740a
742a
10
11
00
01
I
Code word-1
Subchannel-2 (36-SRQAM:D2=3bit+1/8bit)
740b
010 110 1000
001 101 111
000 100 011
742b
Code word-2
741a
741b
Subchannel-3 (144-SRQAM:D3=2bit)
740c
742c
Code word-3
741c
741d
2bit
3+1/8bit
2bit
2bit
9+1/8bit
Code word-4
Subchannel-4 (576-SRQAM:D4=2bit)
740d
742d
741
signal point
code word
11 11 11 11

FIG. 112

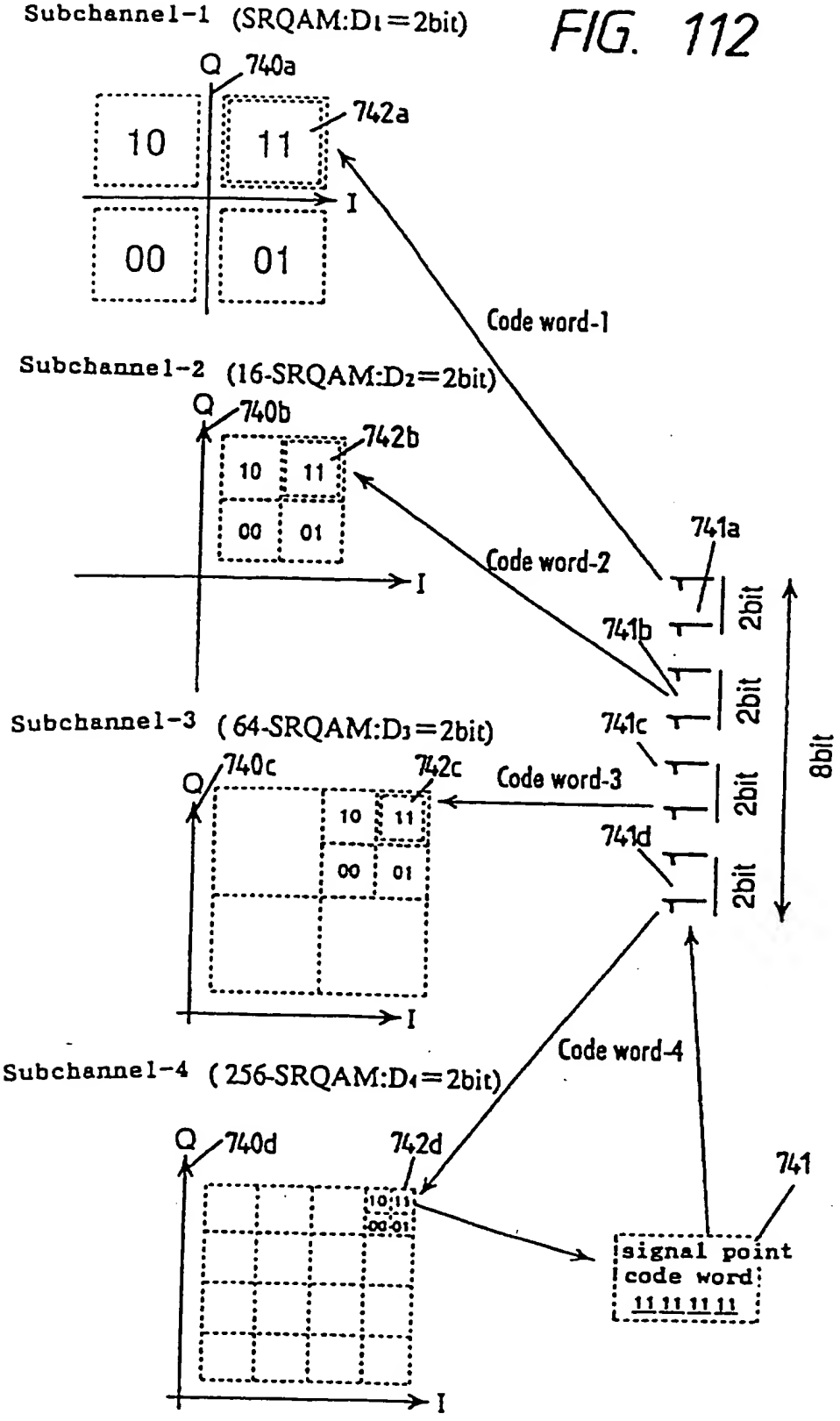
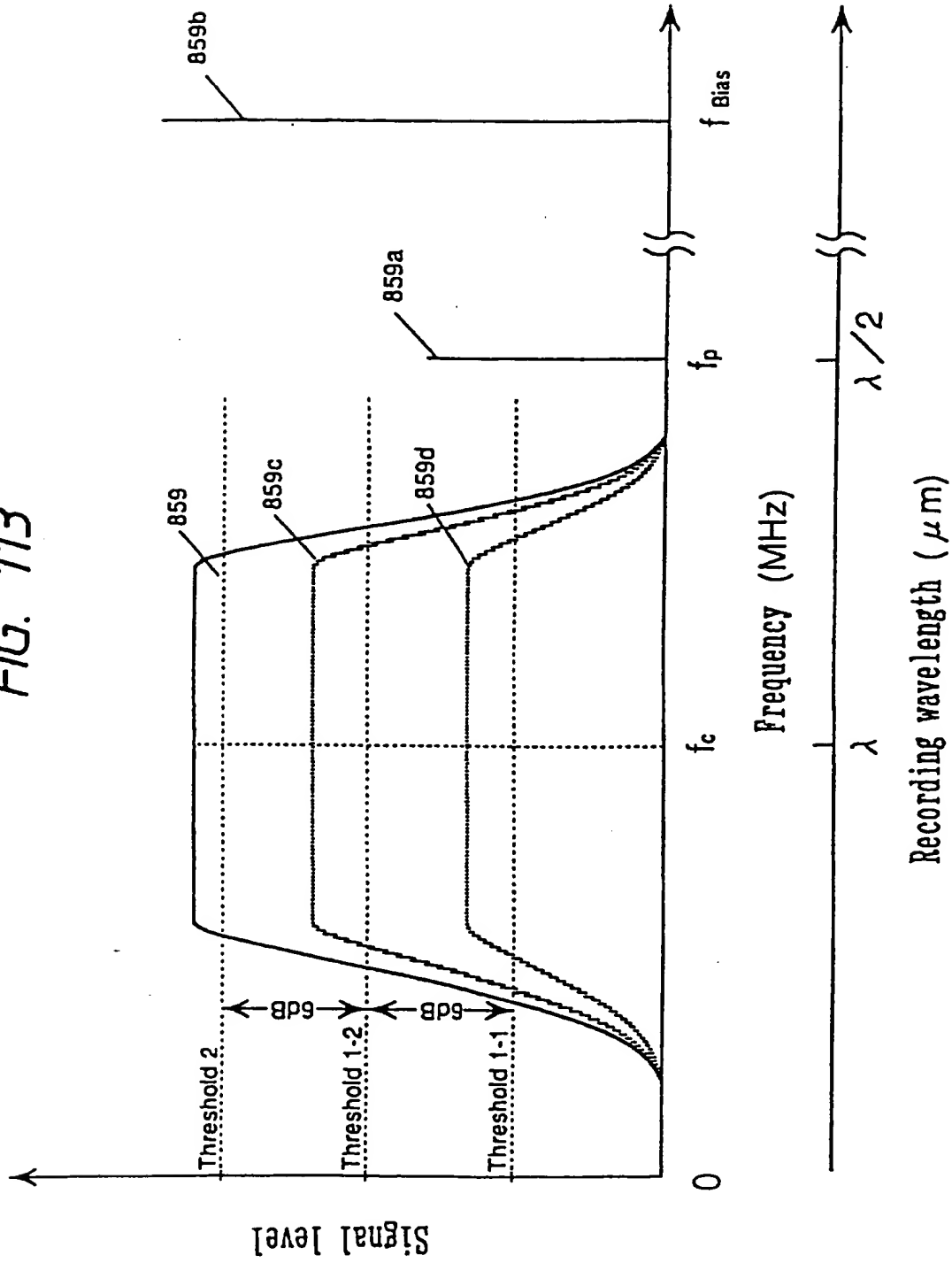

Subchannel-1 (SRQAM:D1=2bit)
Q
740a
742a
10
11
00
01
I
Code word-1
Subchannel-2 (16-SRQAM:D2=2bit)
740b
742b
Code word-2
Subchannel-3 (64-SRQAM:D3=2bit)
740c
742c
Code word-3
Subchannel-4 (256-SRQAM:D4=2bit)
740d
742d
Code word-4
741a
741b
741c
741d
2bit
8bit
741
signal point code word
11 11 11 11

FIG. 113


859b
f Bias
859a
fp
859
859c
859d
fc
6dB
6dB
Threshold 2
Threshold 1-2
Threshold 1-1
0
Signal level
Frequency (MHz)
λ/2
λ
Recording wavelength (μm)

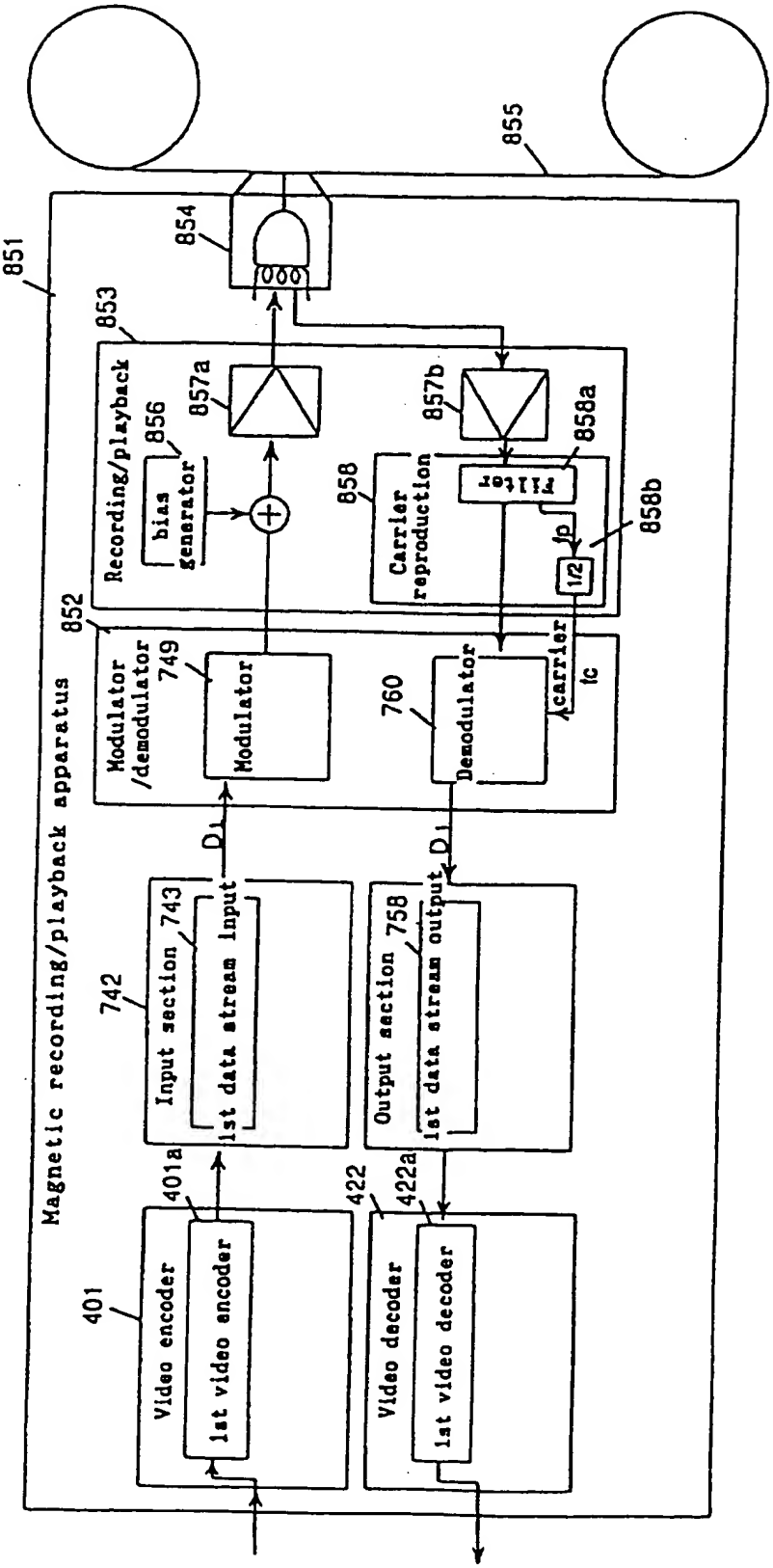

855
854
851
853
Recording/playback
857a
856
bias generator
857b
858a
858
Carrier reproduction
Filter
858b
1/2
852
Modulator /demodulator
749
Modulator
760
Demodulator
carrier
Ic
D1
D1
Magnetic recording/playback apparatus
742
Input section 743
1st data stream input
Output section 758
1st data stream output
401a
422
422a
401
Video encoder
1st video encoder
Video decoder
1st video decoder

FIG. 114

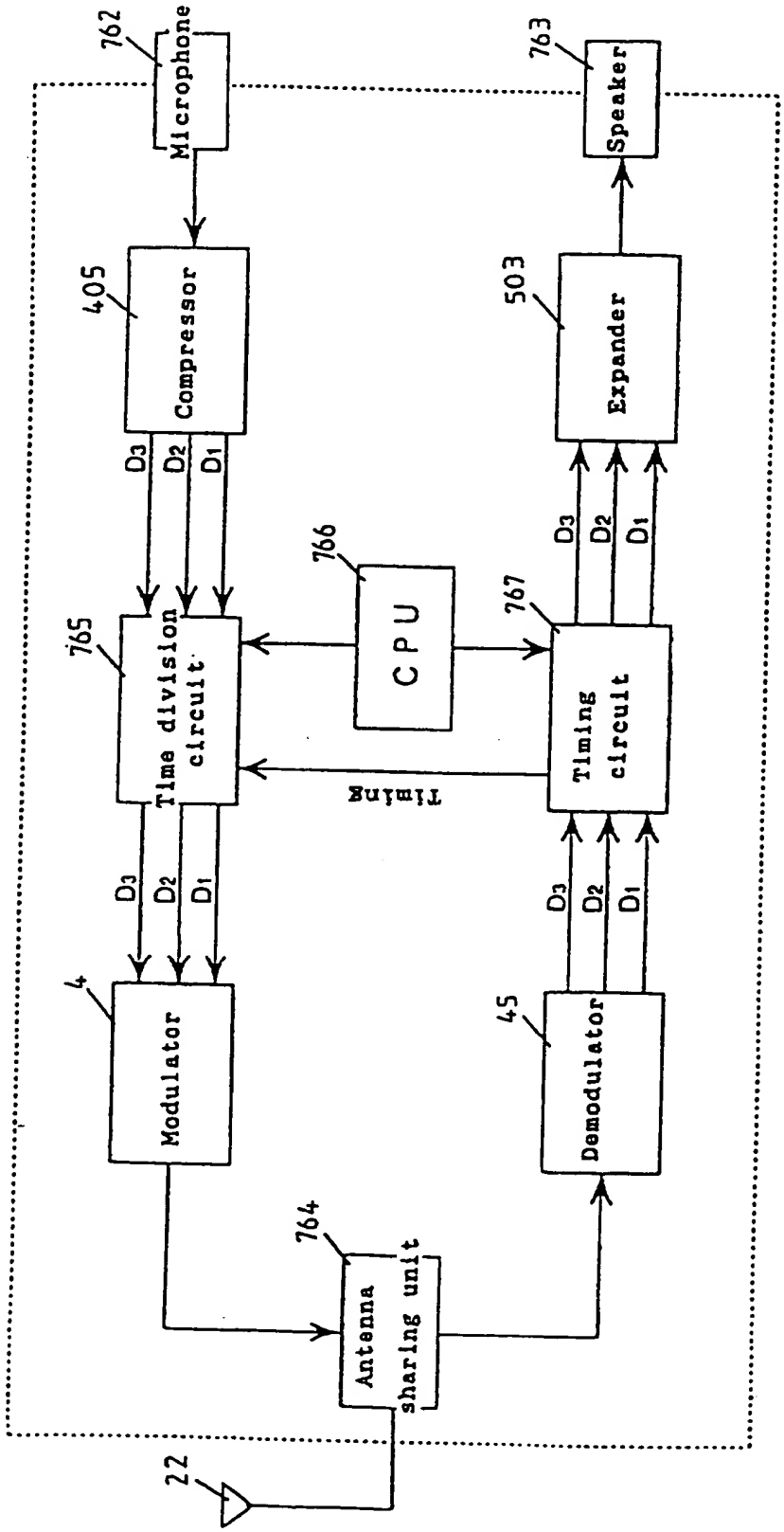

762
Microphone
763
Speaker
405
Compressor
503
Expander
D3
D2
D1
766
CPU
765
Time division circuit
767
Timing circuit
Timing
4
Modulator
45
Demodulator
764
Antenna sharing unit
22

FIG. 115

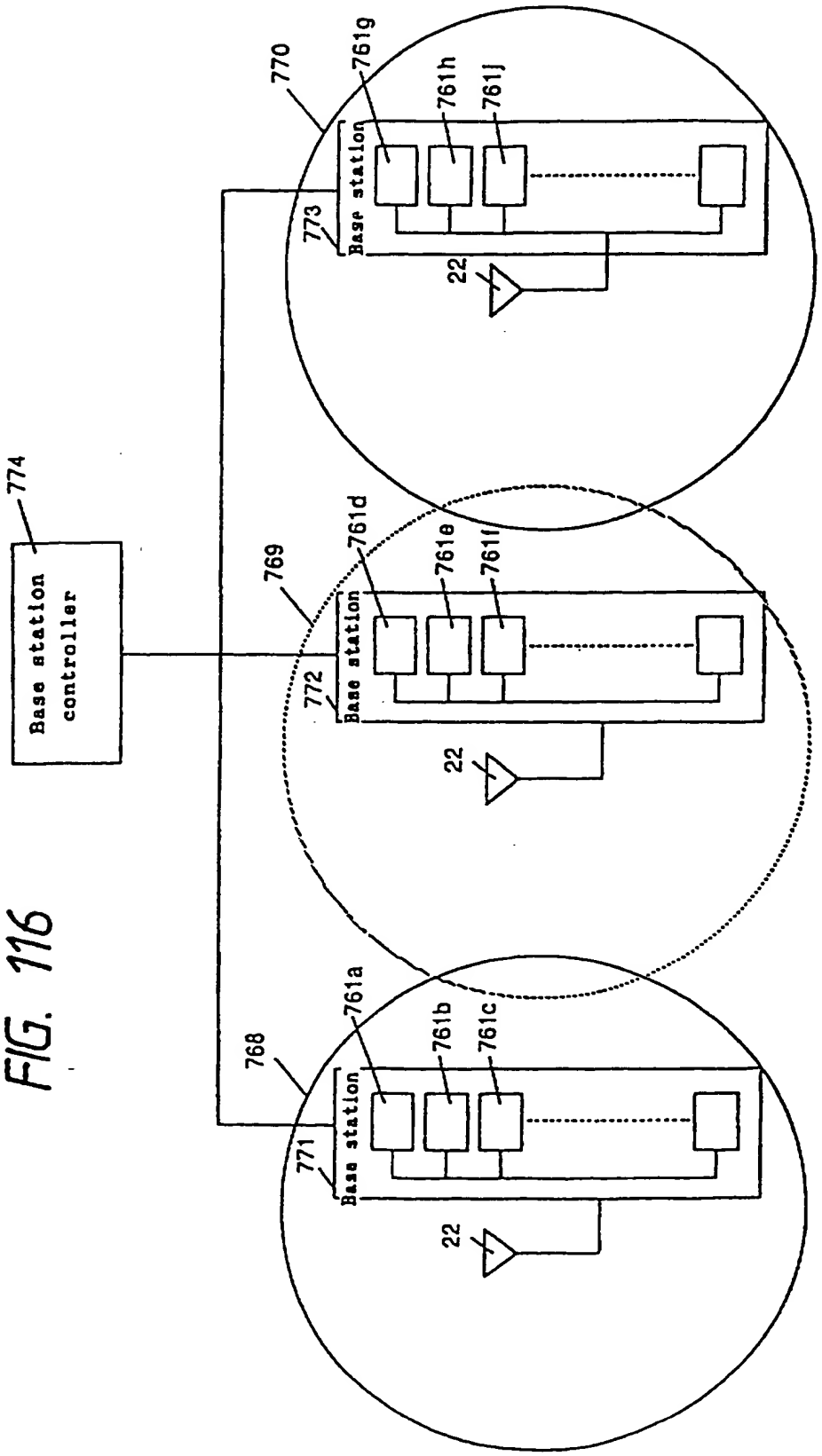

774
Base station controller
770
761g
761h
761j
Base station
773
22
769
761d
761e
761f
Base station
772
22
768
761a
761b
761c
Base station
771
22

FIG. 116

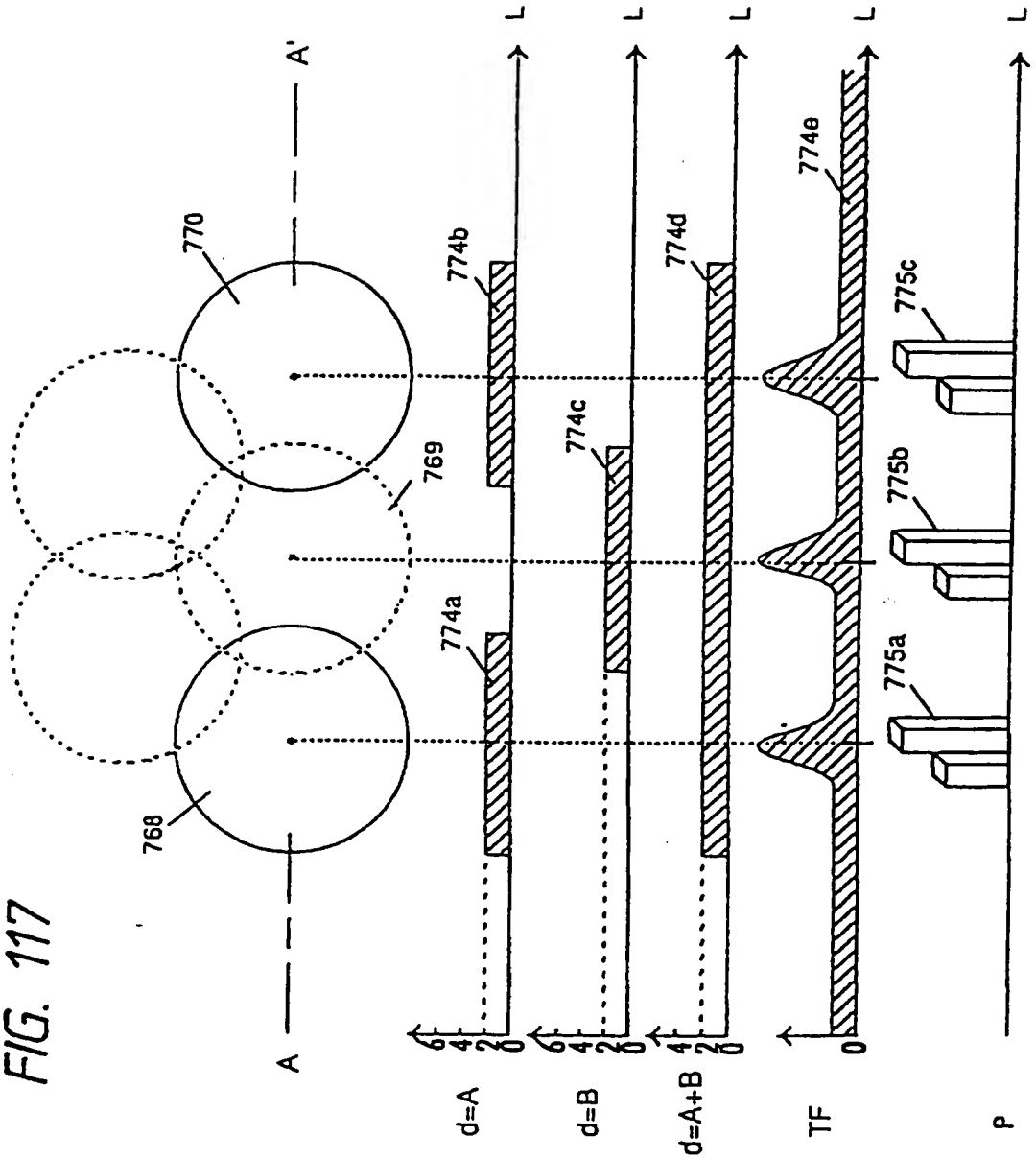

A
A'
768
769
770
774a
774b
774c
774d
774e
775a
775b
775c
L
6
4
2
0
d=A
d=B
d=A+B
TF
P

FIG. 117

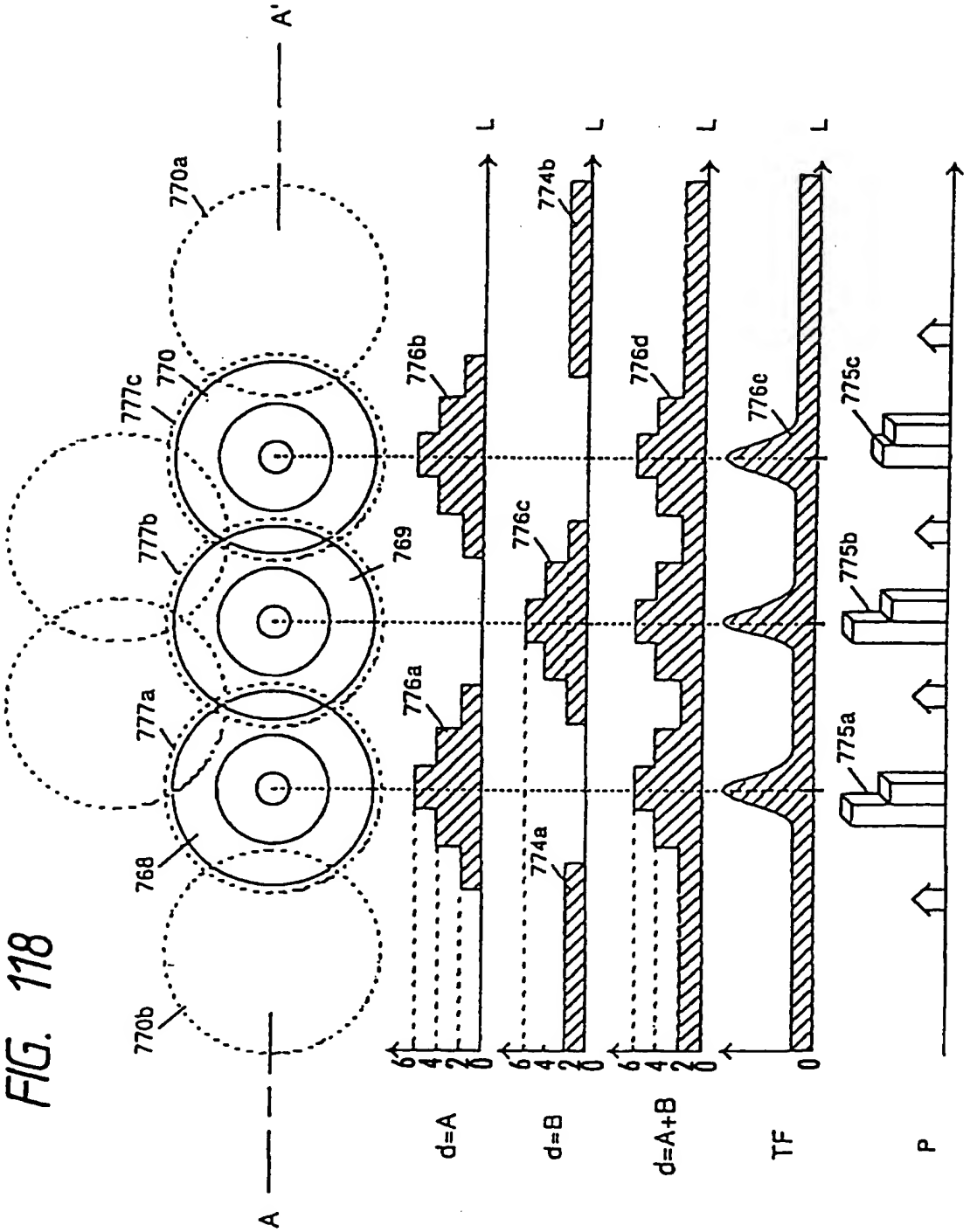

A
A'
770a
770
770b
777c
777b
777a
768
769
776a
776b
776c
776d
774a
774b
775a
775b
775c
L
6
4
2
0
d=A
d=B
d=A+B
TF
P

FIG. 118

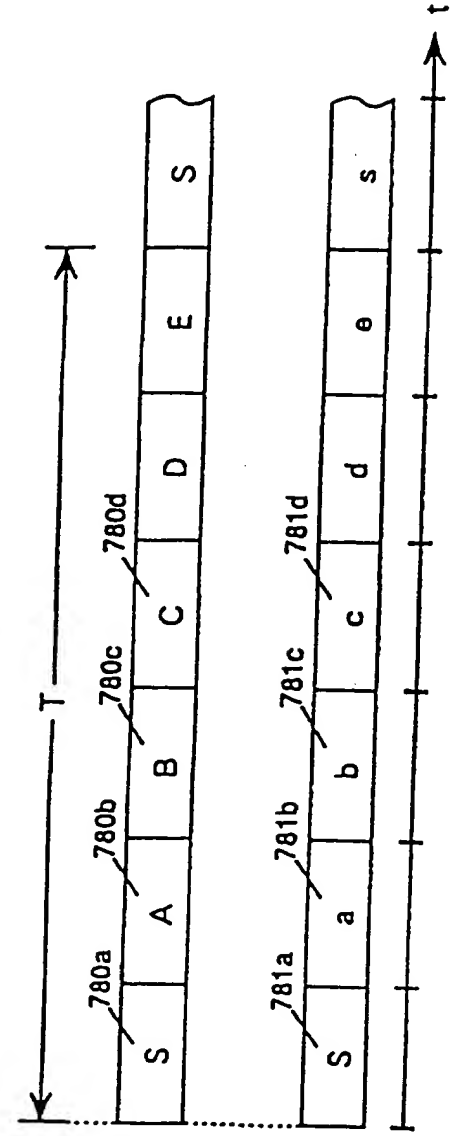


FIG. 119(a)

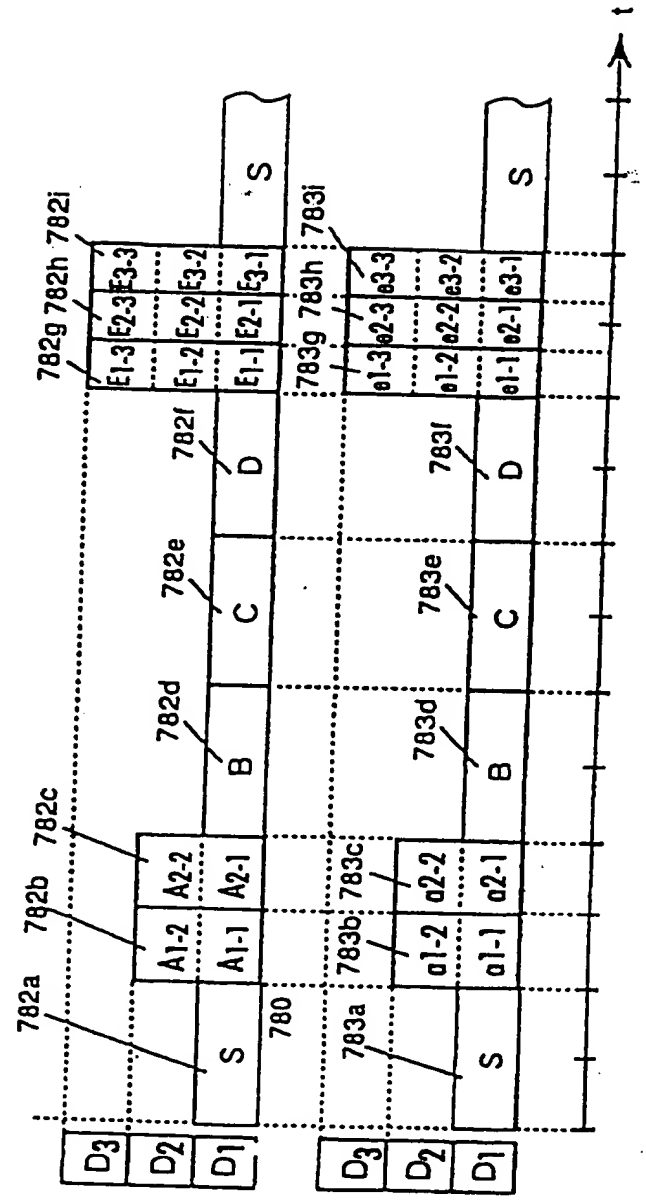


FIG. 119(b)

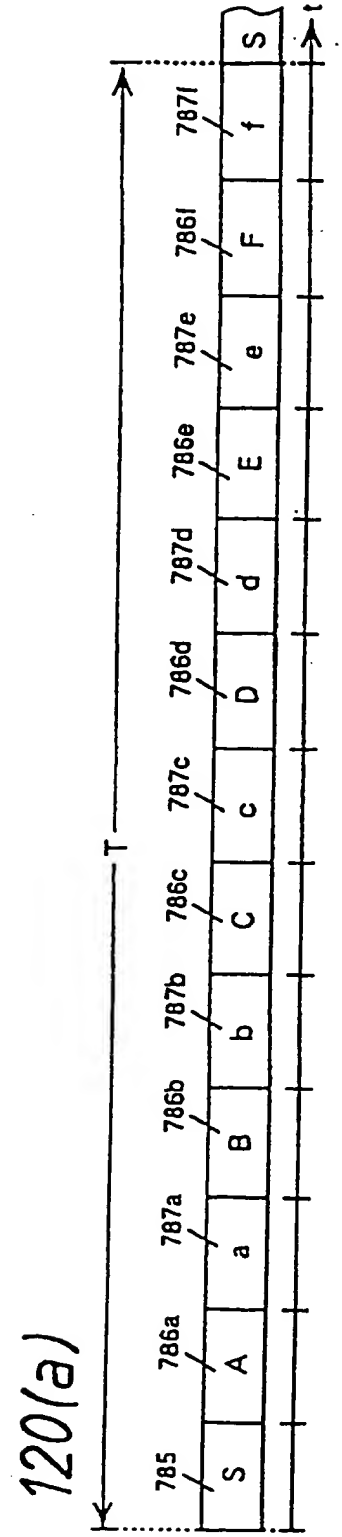


FIG. 120(a)

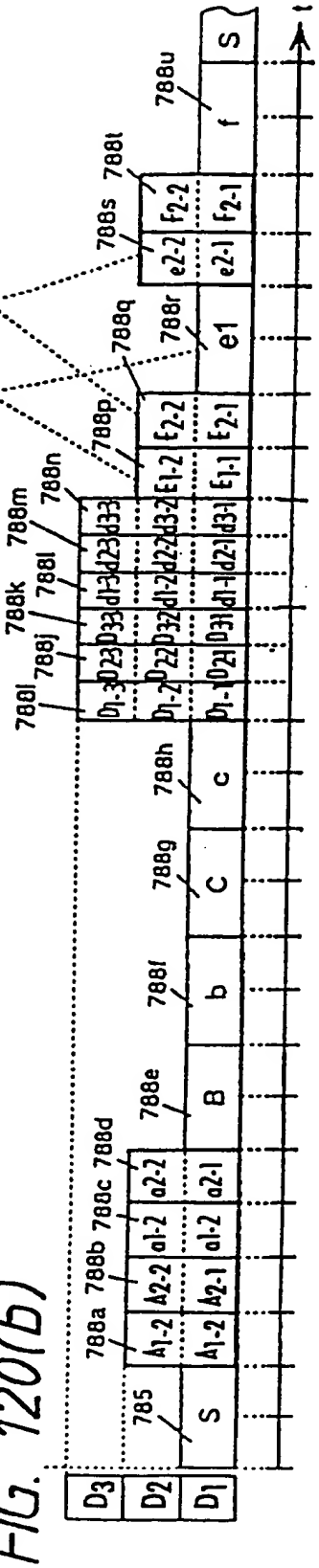


FIG. 120(b)

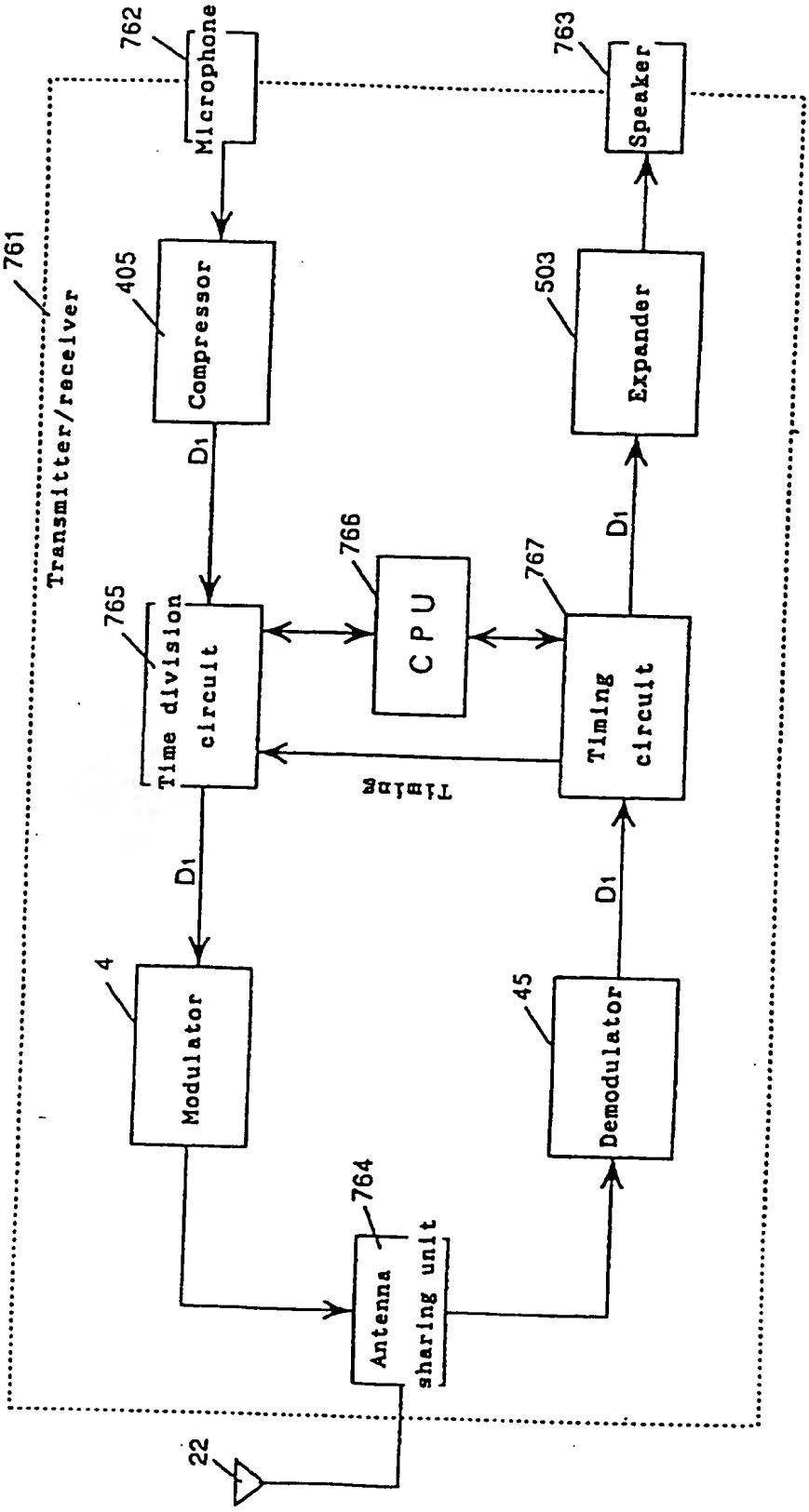

762
Microphone
763
Speaker
761
Transmitter/receiver
405
Compressor
503
Expander
D1
766
CPU
767
765
Time division circuit
Timing circuit
Timing
D1
D1
4
Modulator
45
Demodulator
764
Antenna sharing unit
22

FIG. 121

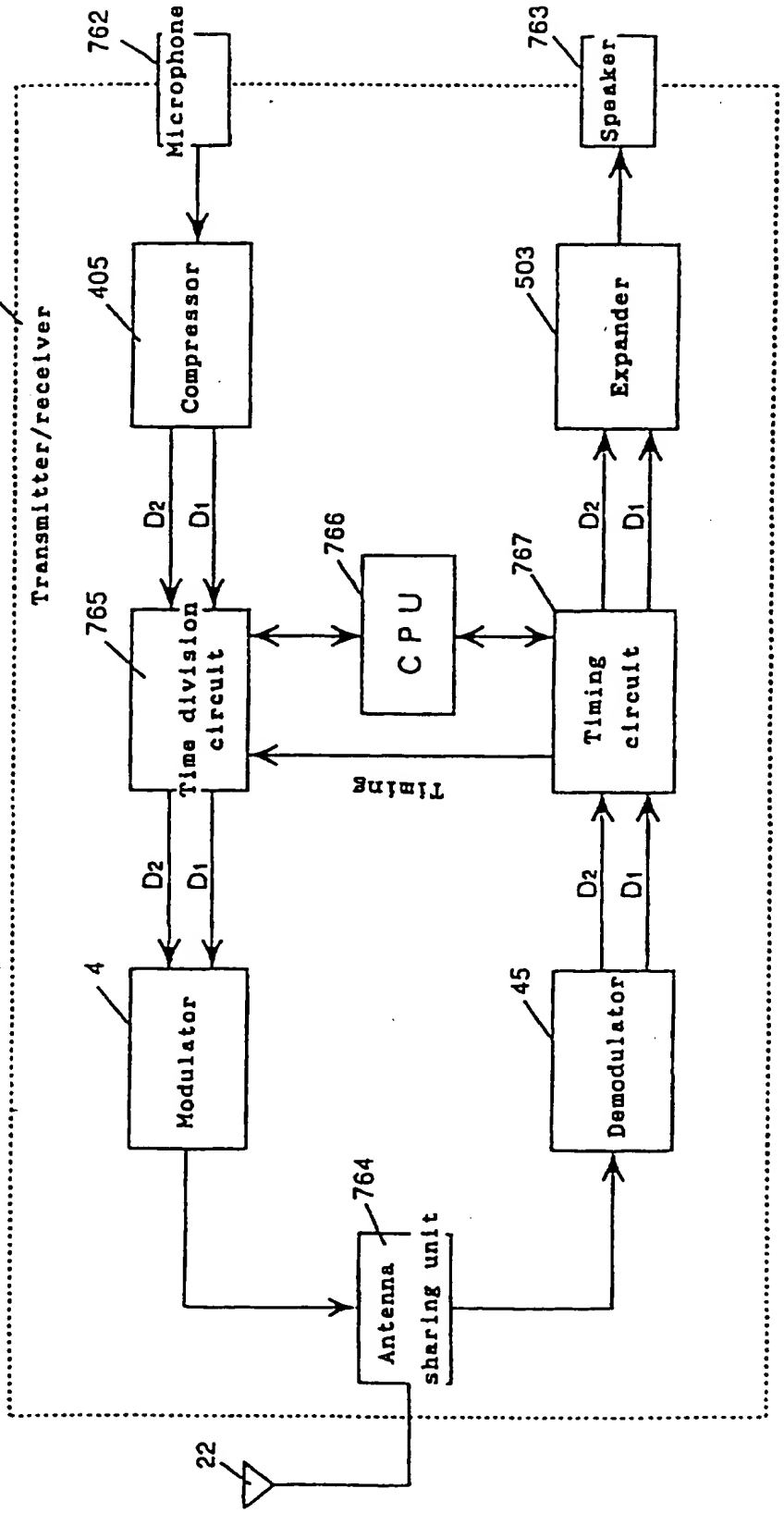
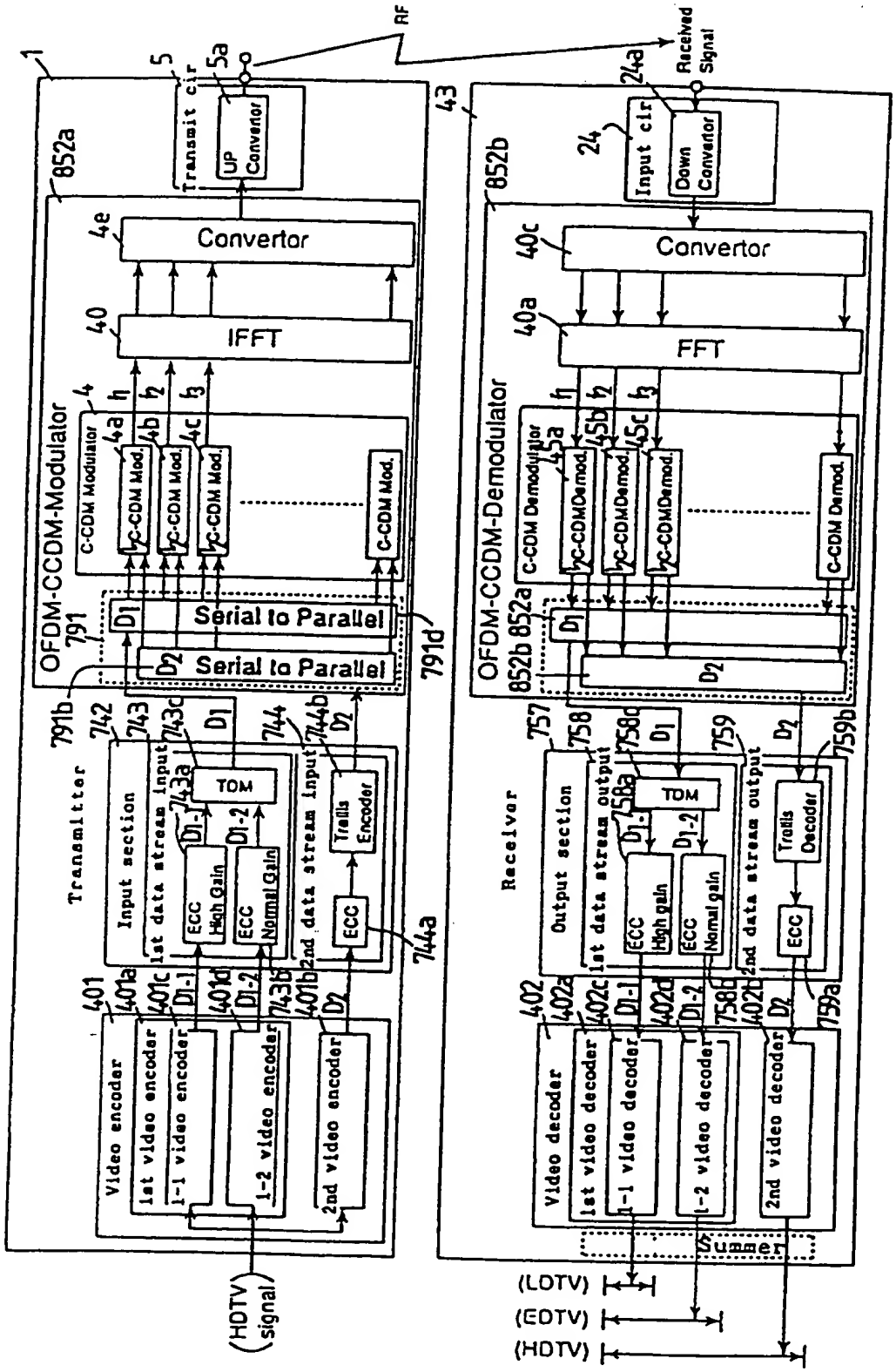

762
Microphone
763
Speaker
761
Transmitter/receiver
405
Compressor
503
Expander
D2
D1
766
CPU
767
765
Time division circuit
Timing circuit
Timing
4
Modulator
45
Demodulator
764
Antenna sharing unit
22

FIG. 122

FIG. 123


RF
Received Signal
Transmitter
Receiver
OFDM-CCDM-Modulator
OFDM-CCDM-Demodulator
Transmit cir
Input cir
UP Convertor
Down Convertor
Convertor
IFFT
FFT
C-CDM Modulator
C-CDM Demodulator
C-CDM Mod.
C-CDM Demod.
Serial to Parallel
Input section
Output section
1st data stream input
2nd data stream input
1st data stream output
2nd data stream output
TDM
ECC
High Gain
Normal Gain
High gain
Normal gain
Trellis Encoder
Trellis Decoder
Video encoder
1st video encoder
1-1 video encoder
1-2 video encoder
2nd video encoder
Video decoder
1st video decoder
1-1 video decoder
1-2 video decoder
2nd video decoder
Summer
(HDTV) signal
(LDTV)
(EDTV)
(HDTV)

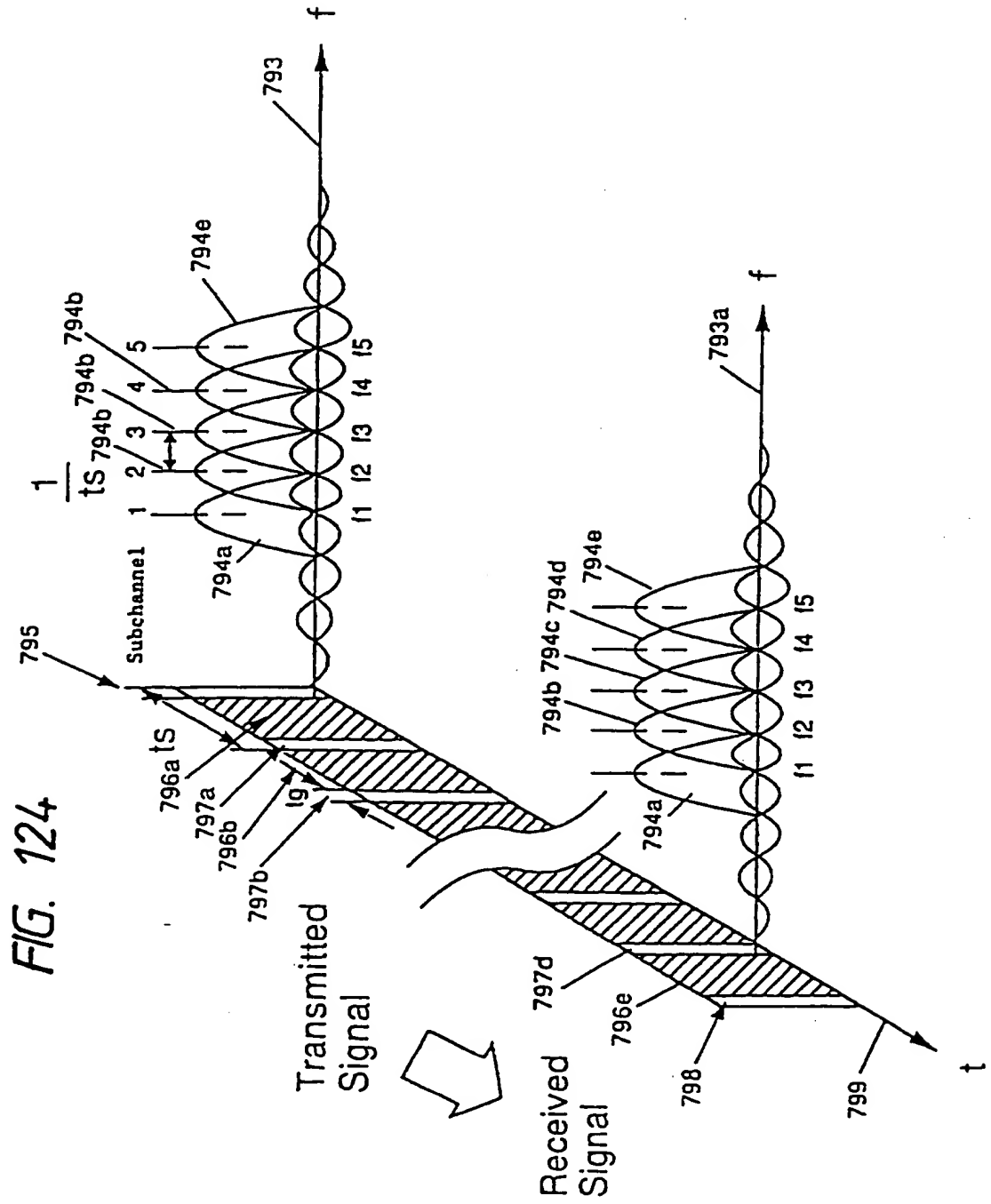

f
793
794e
794b
794b
794b
5
4
3
2
1
1/tS
Subchannel
794a
11 12 13 14 15
795
tS
796a
797a
796b
797b
Transmitted Signal
Received Signal
797d
796e
798
799
t
793a
794d
794c
794b
794a

FIG. 124

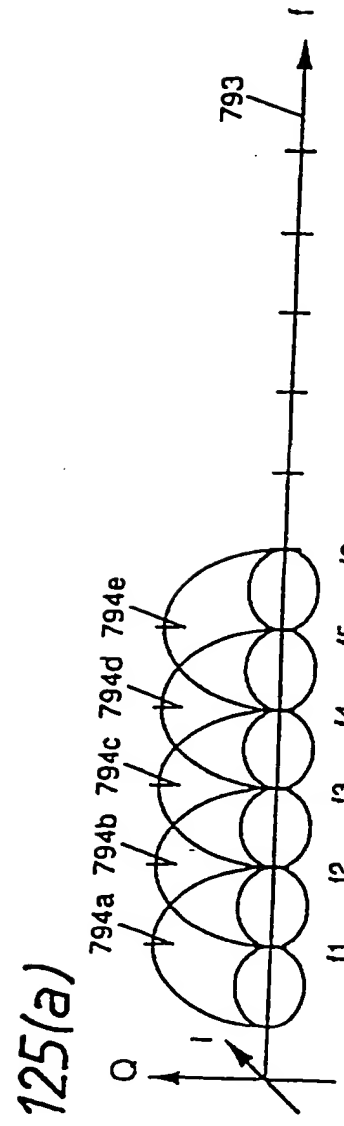


FIG. 125(a)

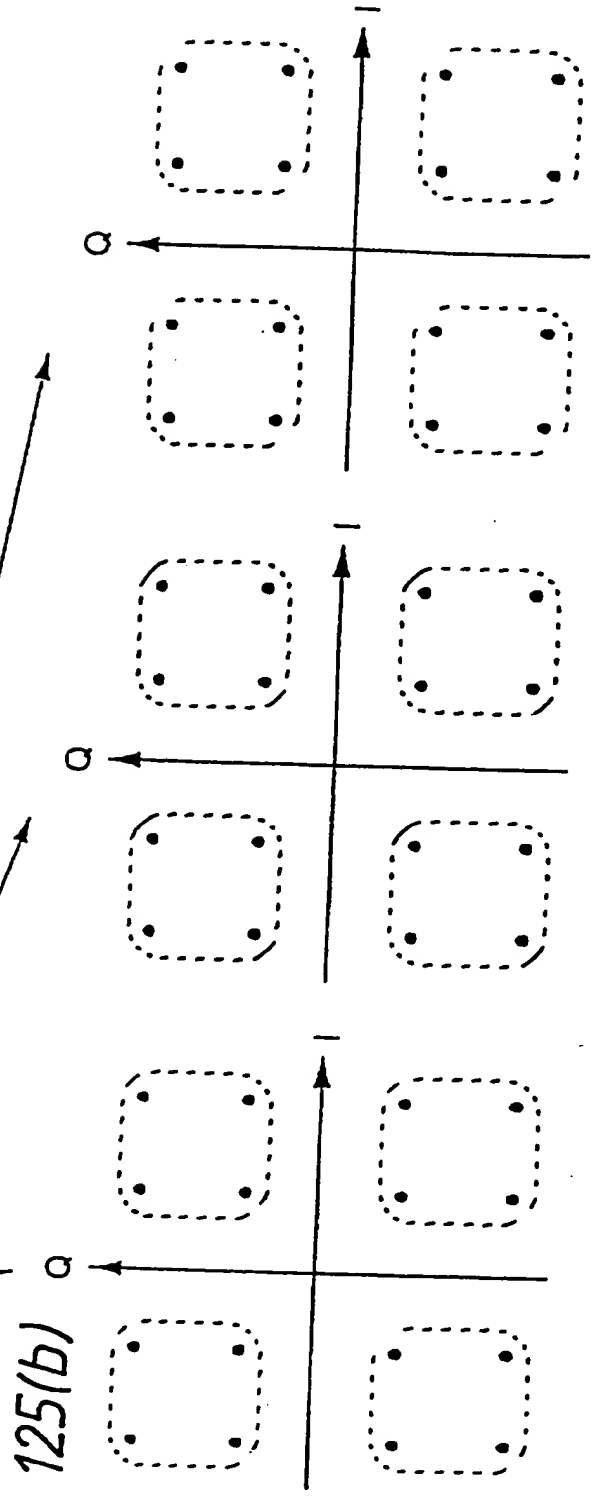


FIG. 125(b)

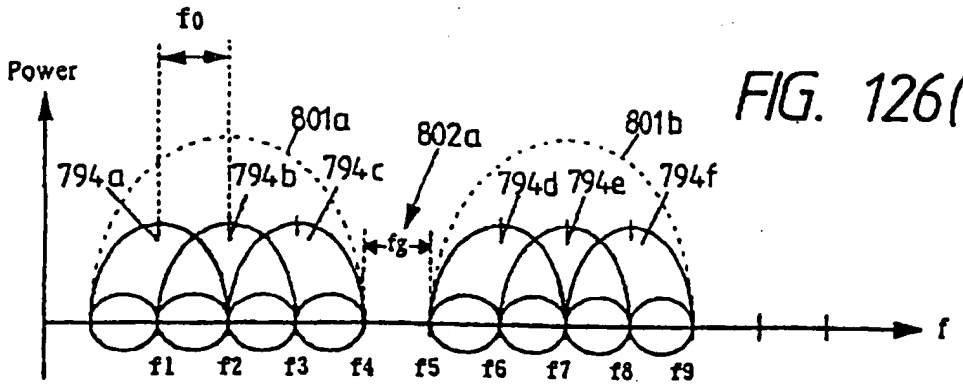


FIG. 126(a)

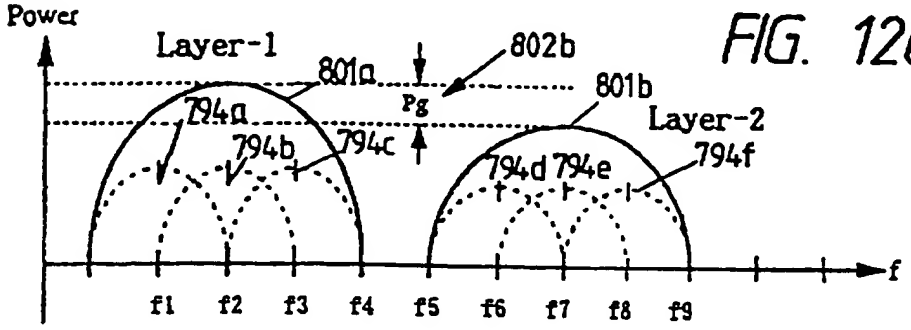


FIG. 126(b)

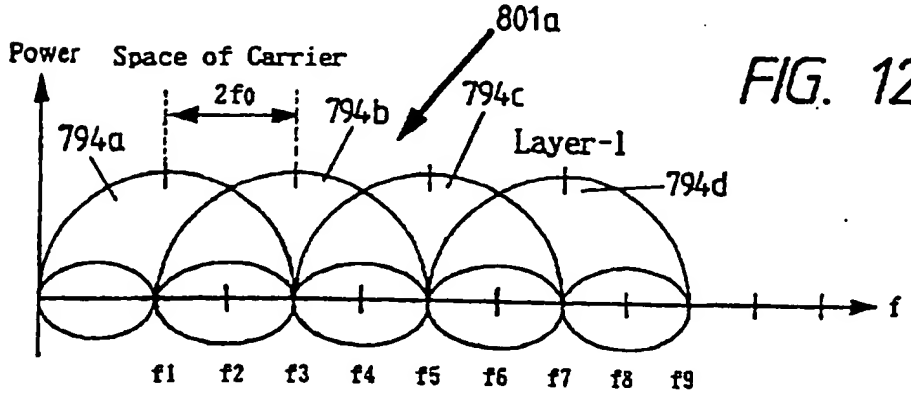


FIG. 126(c)

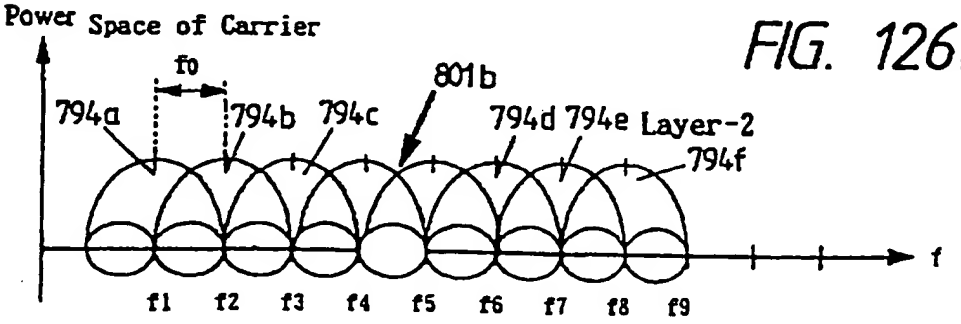


FIG. 126(d)

FIG. 127

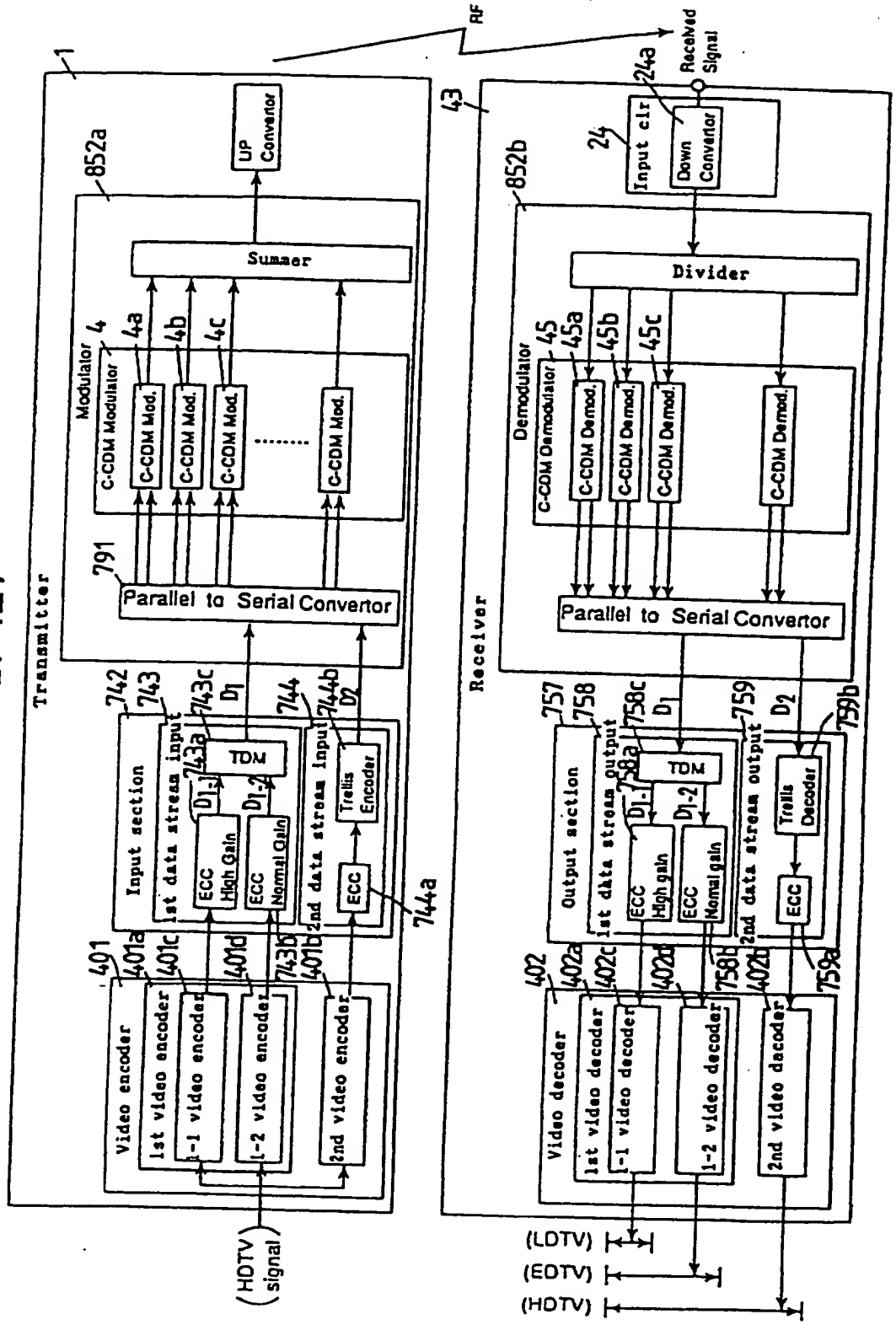

Transmitter
Receiver
RF
Received Signal
UP Convertor
Summer
Modulator
C-CDM Modulator
C-CDM Mod.
Parallel to Serial Convertor
Input section
1st data stream input
2nd data stream input
TDZ
ECC
High Gain
Normal Gain
Trellis Encoder
Video encoder
1st video encoder
1-1 video encoder
1-2 video encoder
2nd video encoder
(HDTV signal)
Input clr
Down Convertor
Divider
Demodulator
C-CDM Demodulator
C-CDM Demod.
Output section
1st data stream output
2nd data stream output
Trellis Decoder
Video decoder
1st video decoder
1-1 video decoder
1-2 video decoder
2nd video decoder
(LDTV)
(EDTV)
(HDTV)

FIG. 128(a)

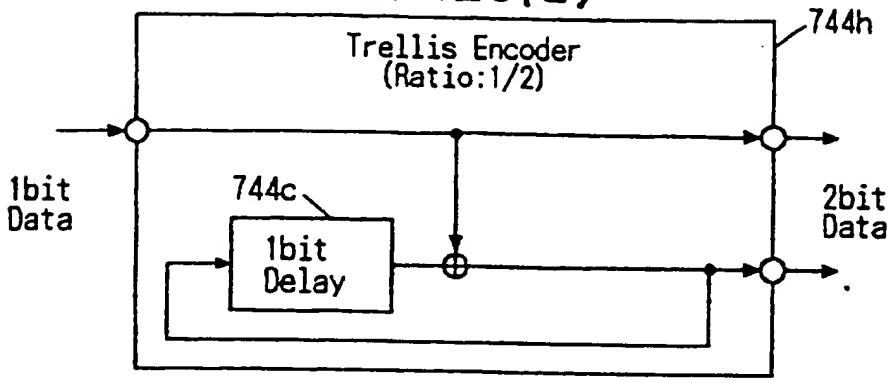


FIG. 128(b)

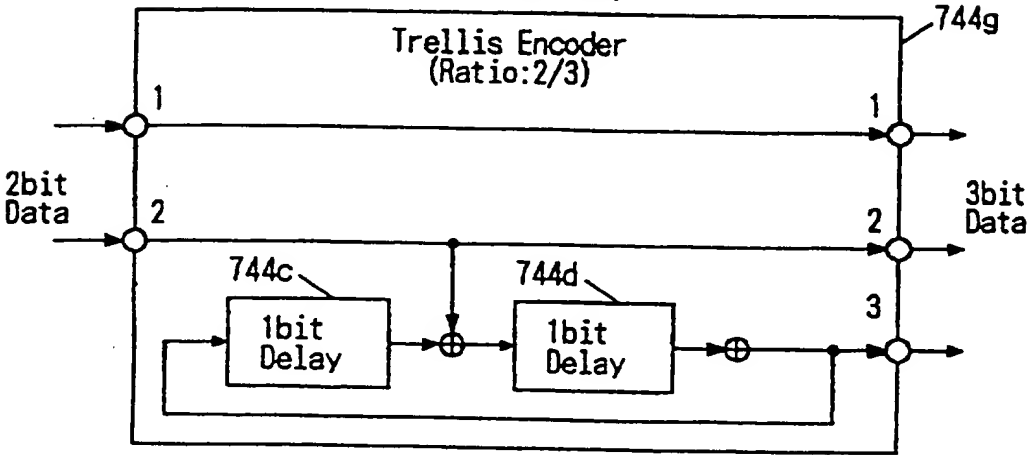


FIG. 128(c)

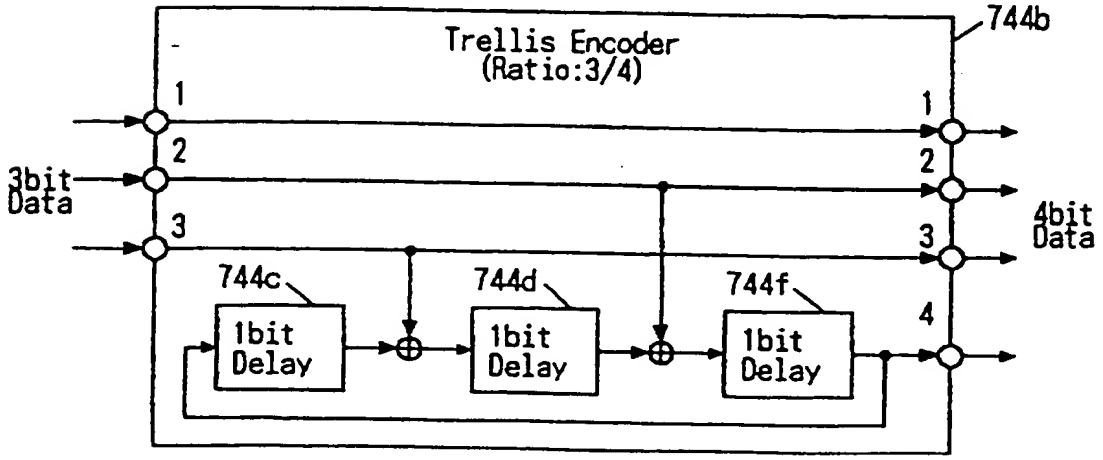


FIG. 128(d)

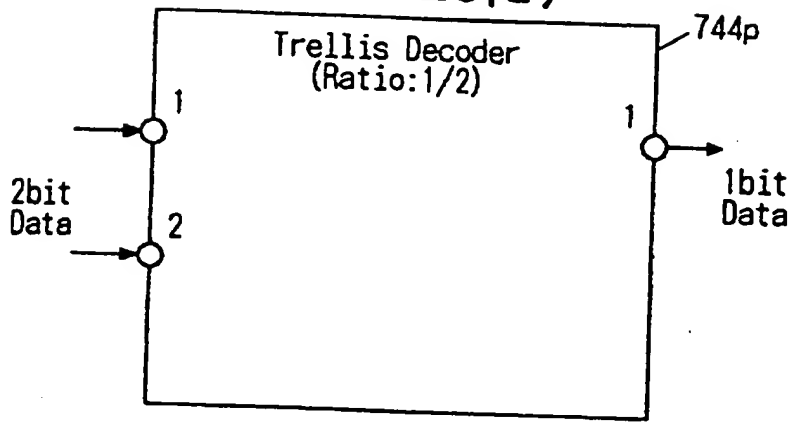


FIG. 128(e)

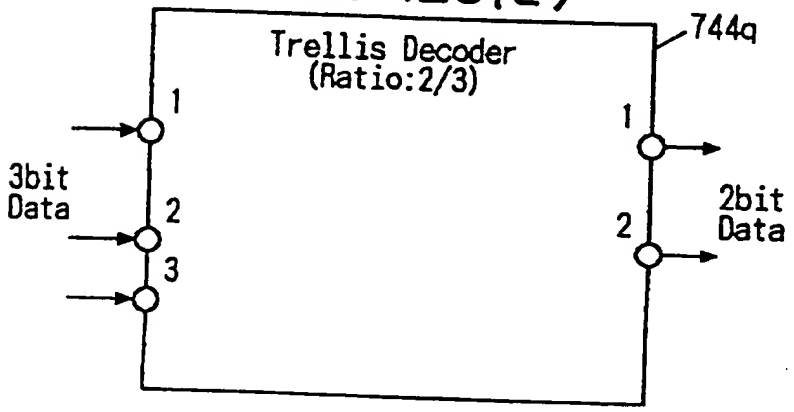
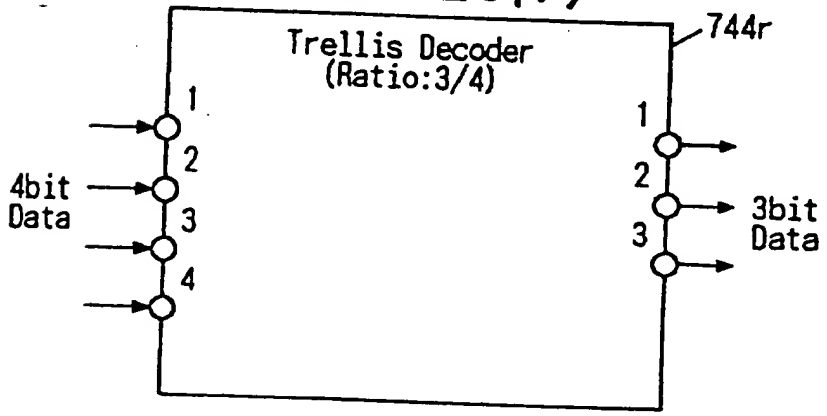


FIG. 128(f)



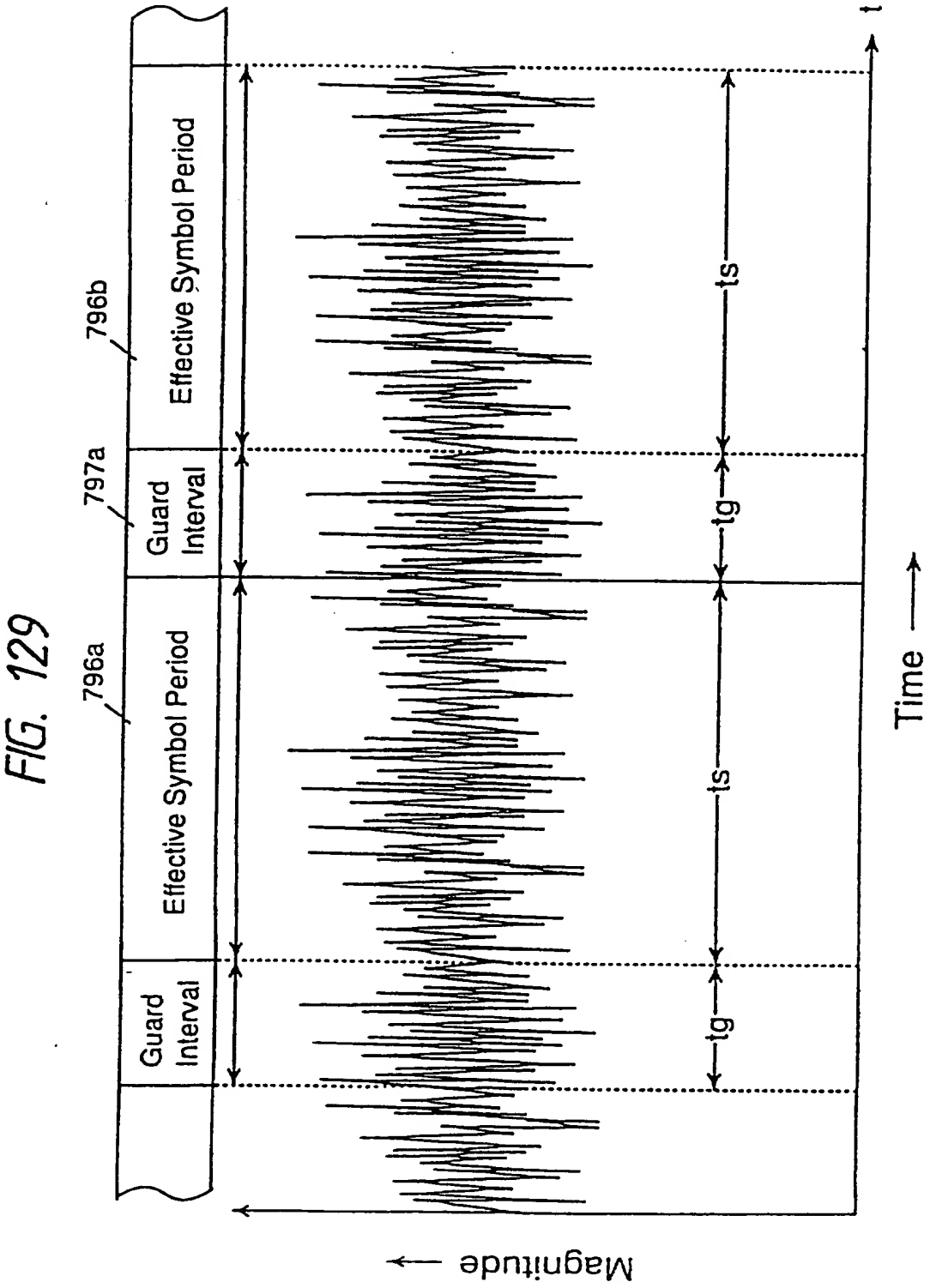

796b
Effective Symbol Period
797a
Guard Interval
796a
Effective Symbol Period
Guard Interval
ts
tg
ts
tg
t
Time
Magnitude

FIG. 129

FIG. 130

Figure 8 Bit Error Rate Performance Under Single Ghost and Gaussian Noise (1)

GHOST DELAY=2us. D/U=8dB

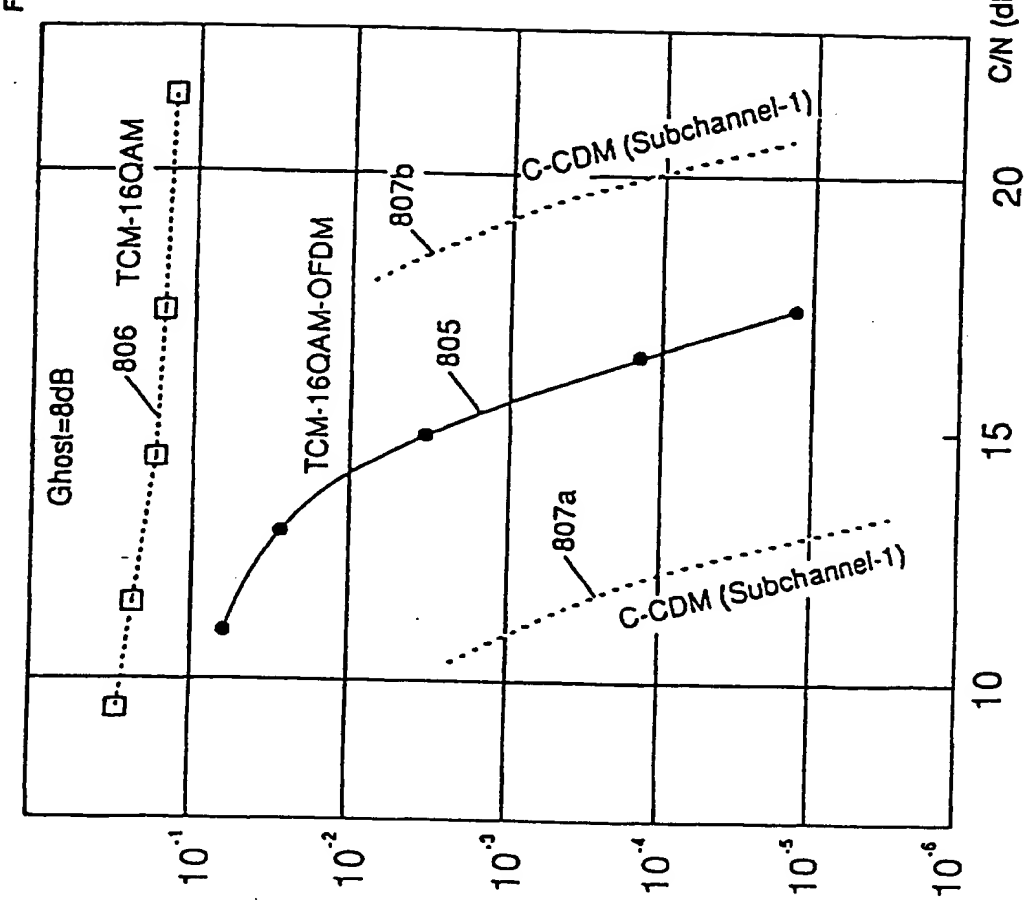
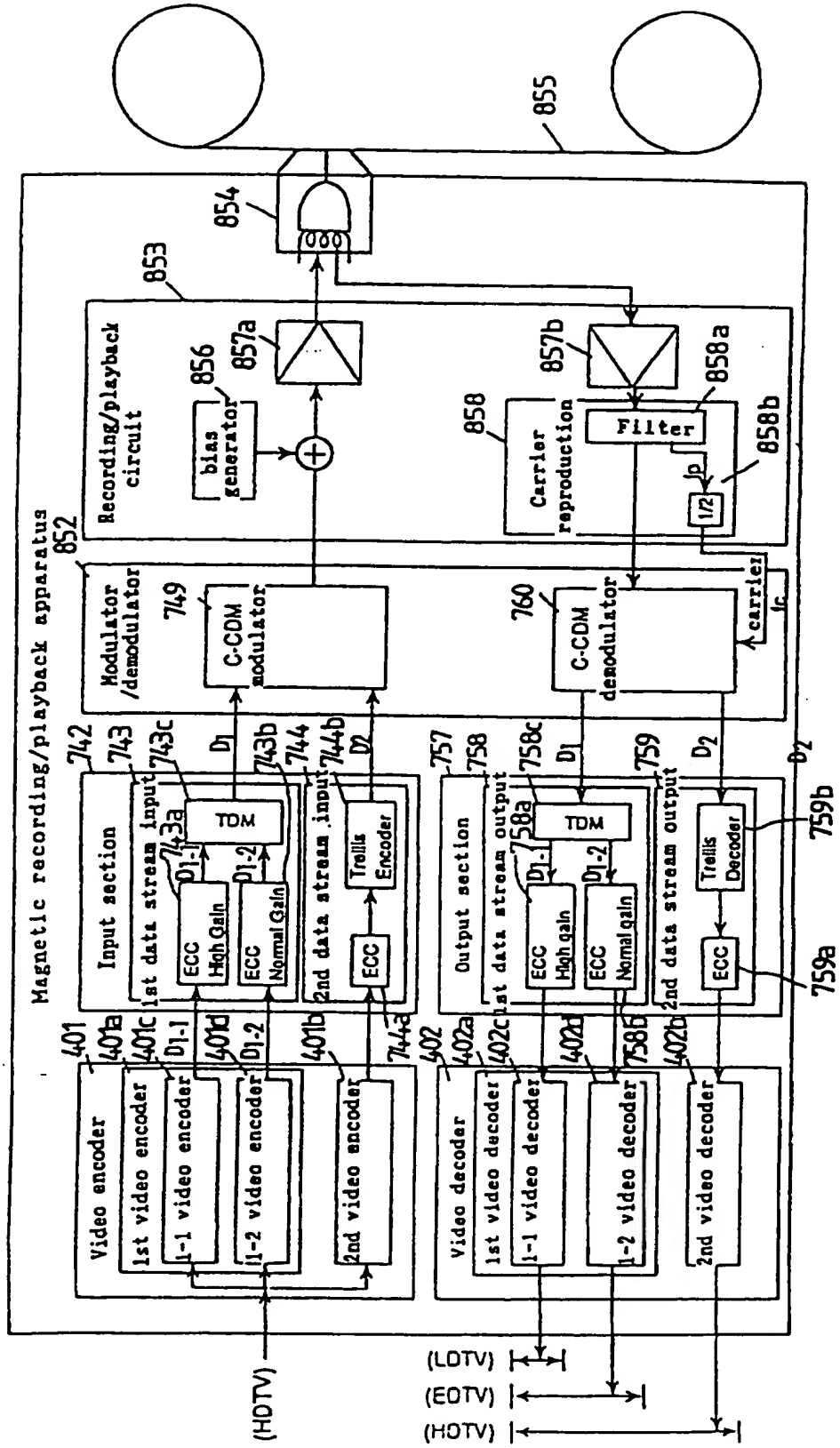


FIG. 131


Magnetic recording/playback apparatus
855
854
853
Recording/playback circuit
856
857a
bias generator
857b
858a
858
Carrier reproduction
Filter
858b
1/2
852
Modulator /demodulator
749
C-CDM modulator
760
C-CDM demodulator
carrier
742
743
743c
D1
743b
744
744b
D2
Input section
1st data stream input
TDM
ECC High Gain
ECC Normal Gain
2nd data stream input
Trellis Encoder
ECC
757
758
758c
759
Output section
1st data stream output
2nd data stream output
Trellis Decoder
759b
759a
401
401a
401c
401d
401b
744a
402
402a
402c
402d
758b
402b
Video encoder
1st video encoder
1-1 video encoder
1-2 video encoder
2nd video encoder
Video decoder
1st video decoder
1-1 video decoder
1-2 video decoder
2nd video decoder
(HDTV)
(LDTV)
(EDTV)
(HDTV)

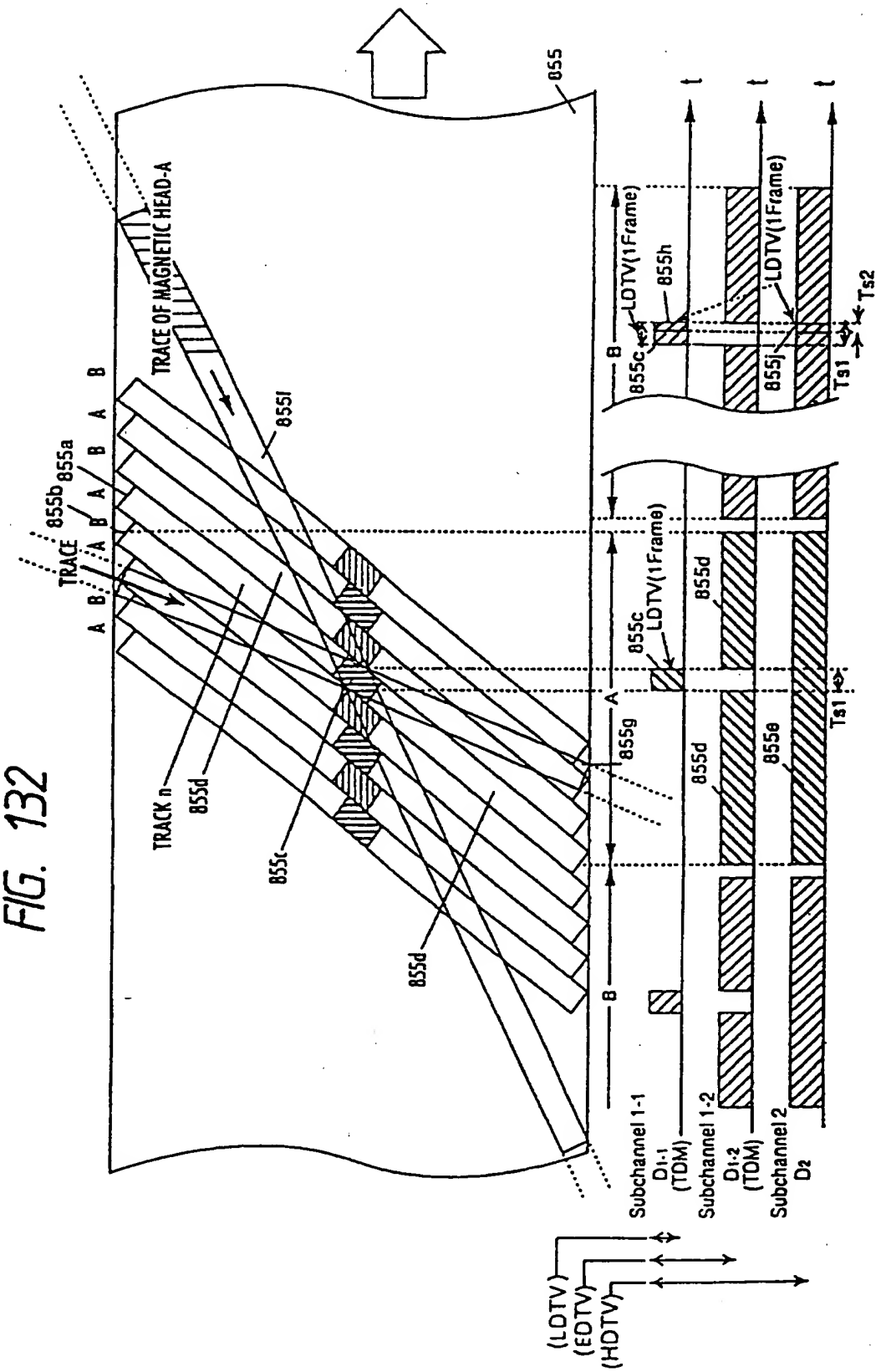
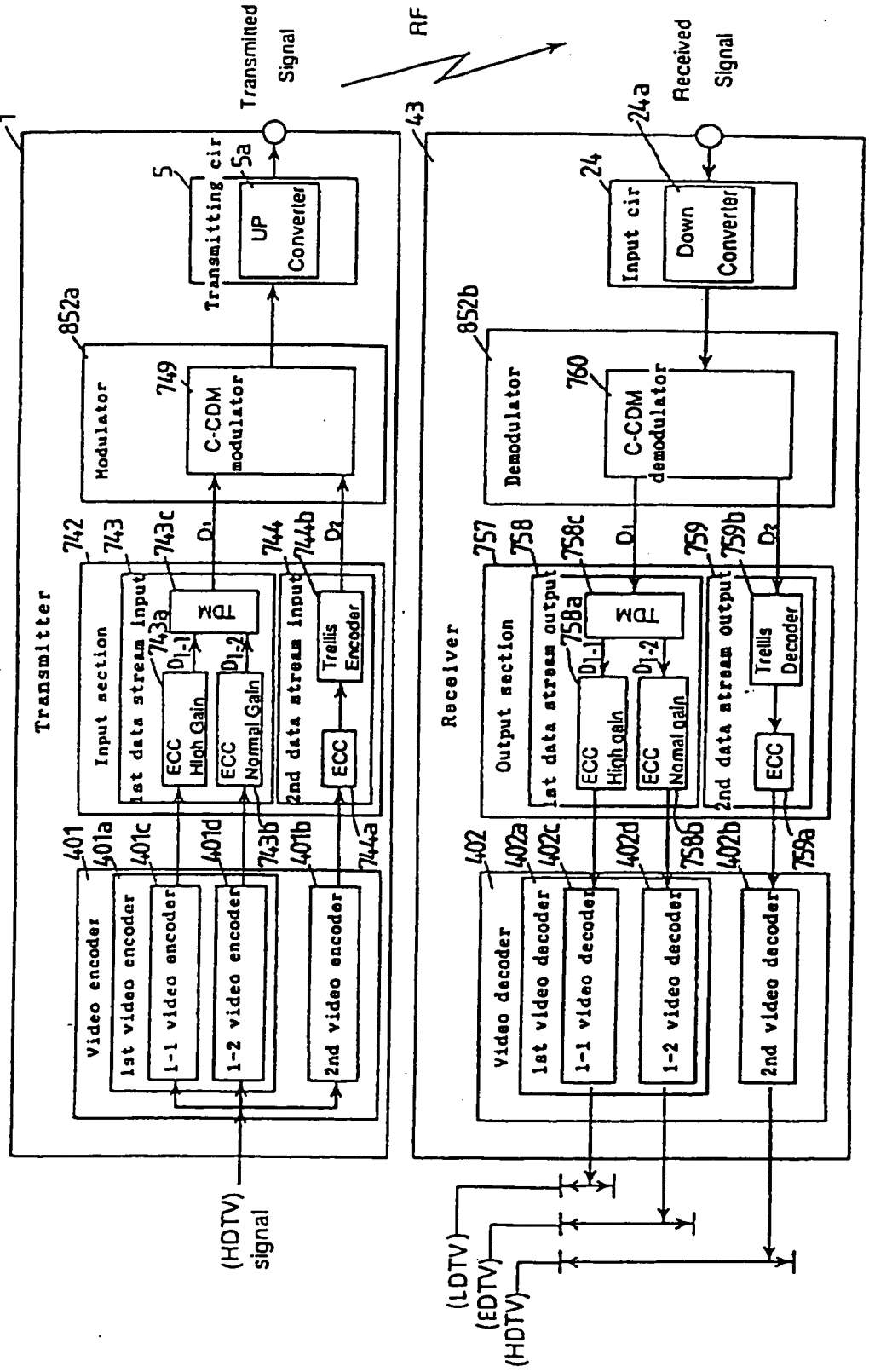

855
TRACE OF MAGNETIC HEAD-A
855l
855b
855a
TRACE
A B A B A B
TRACK n
855d
855c
855d
855d
B
A
B
855g
LDTV(1Frame)
855c
855h
855d
855e
855j
Ts1
Ts2
t
Subchannel 1-1
D1-1
(TDM)
Subchannel 1-2
D1-2
(TDM)
Subchannel 2
D2
(LDTV)
(EDTV)
(HDTV)

FIG. 132

FIG. 133


Transmitter
Receiver
Transmitted Signal
RF
Received Signal
Transmitting cir
UP Converter
Input cir
Down Converter
Modulator
C-CDM modulator
Demodulator
C-CDM demodulator
Input section
Output section
1st data stream input
2nd data stream input
1st data stream output
2nd data stream output
ECC High Gain
ECC Normal Gain
Trellis Encoder
ECC High gain
ECC Nomal gain
Trellis Decoder
Video encoder
1st video encoder
1-1 video encoder
1-2 video encoder
2nd video encoder
Video decoder
1st video decoder
1-1 video decoder
1-2 video decoder
2nd video decoder
(HDTV) signal
(LDTV)
(EDTV)
(HDTV)

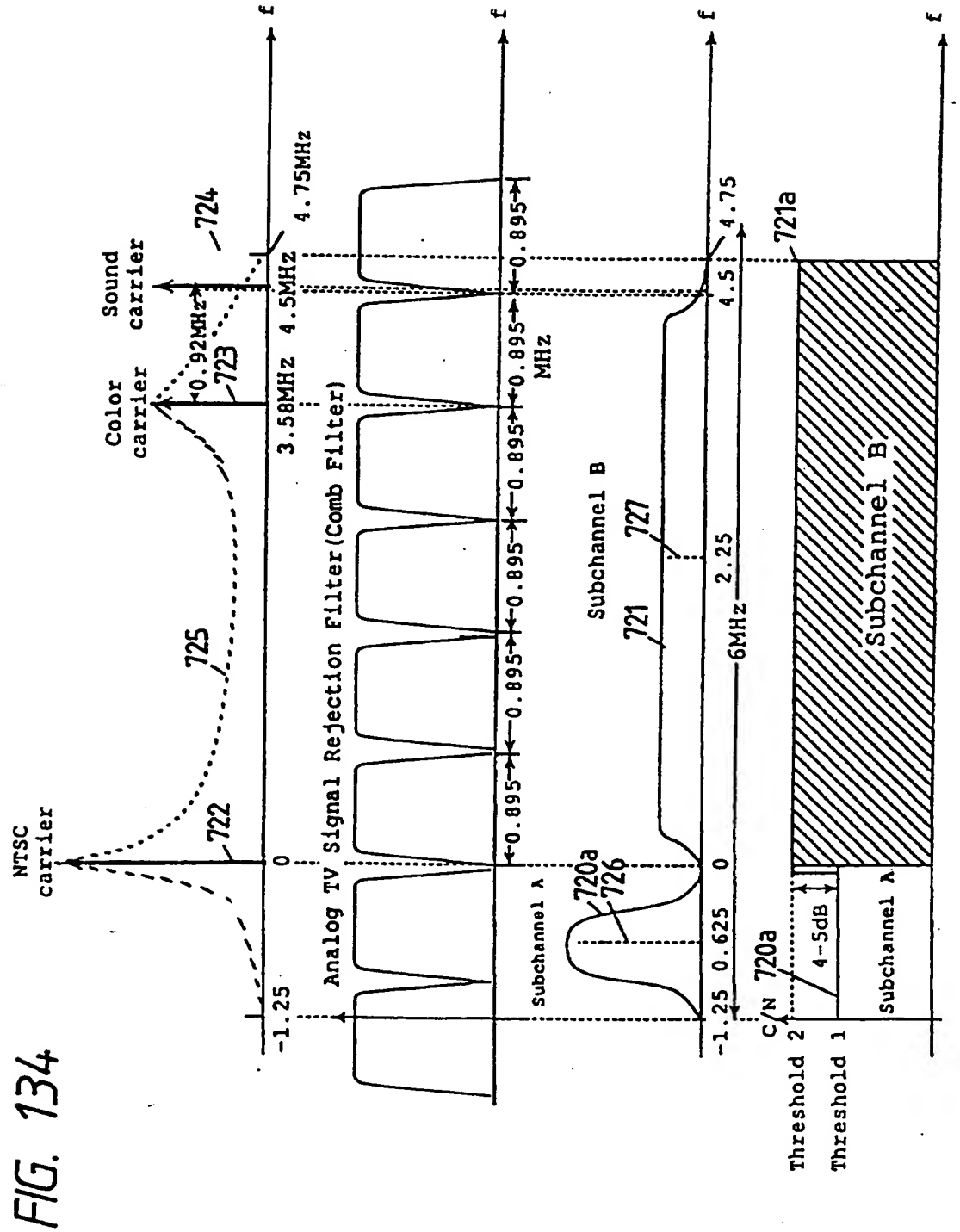

NTSC carrier
722
Color carrier
0.92MHz
723
Sound carrier
724
4.75MHz
4.5MHz
3.58MHz
725
Analog TV Signal Rejection Filter(Comb Filter)
0.895
MHz
-1.25
0
Subchannel A
720a
726
Subchannel B
727
721
2.25
6MHz
0.625
4.5
4.75
721a
C/N
4-5dB
Threshold 2
Threshold 1
f

FIG. 134

FIG. 135

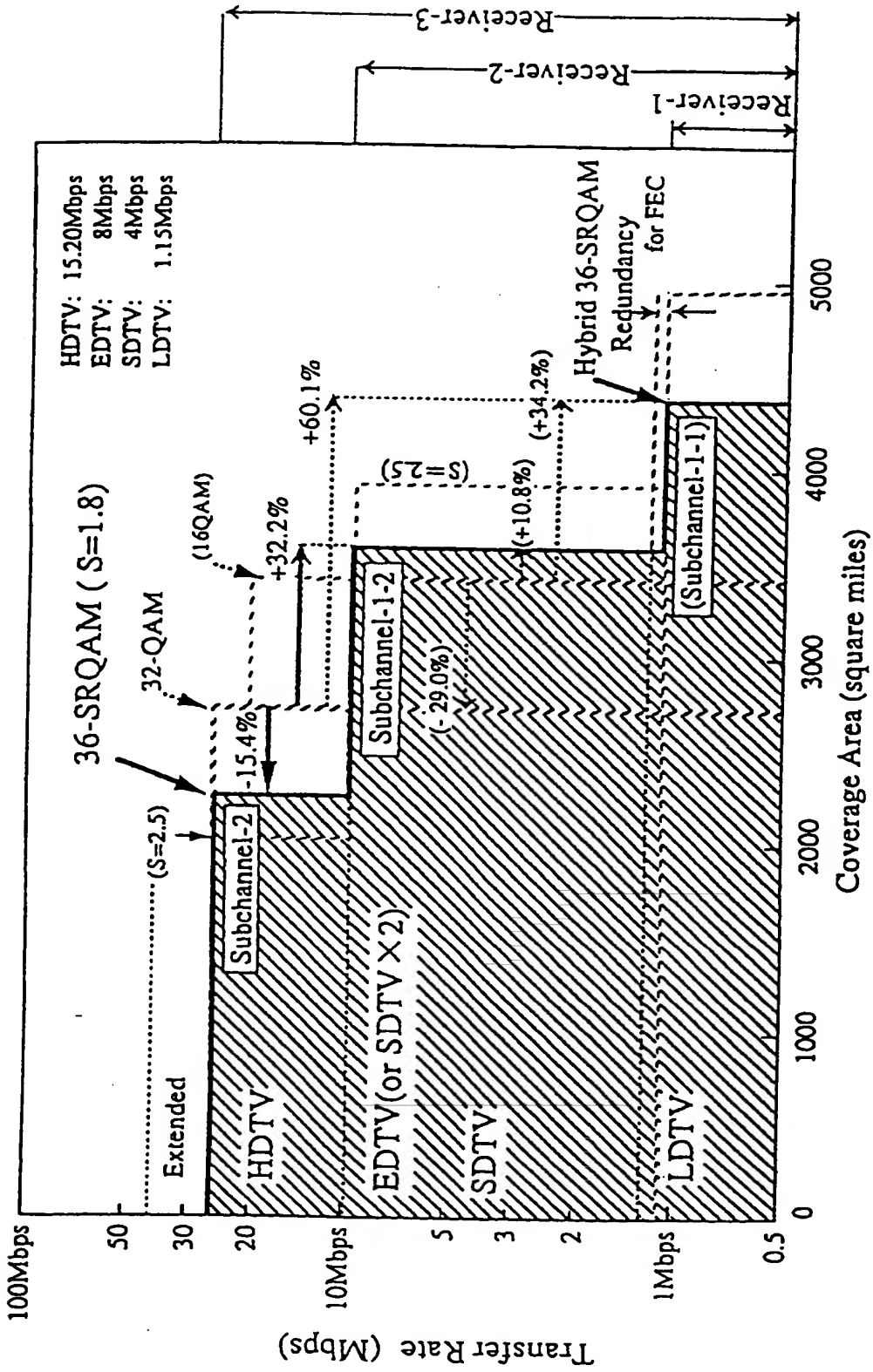

Receiver-3
Receiver-2
Receiver-1
HDTV: 15.20Mbps
EDTV: 8Mbps
SDTV: 4Mbps
LDTV: 1.15Mbps
Hybrid 36-SRQAM
Redundancy for FEC
+60.1%
(+34.2%)
(S=2.5)
(+10.8%)
(16QAM)
+32.2%
36-SRQAM (S=1.8)
32-QAM
-15.4%
(S=2.5)
Subchannel-2
Subchannel-1-2
(-29.0%)
(Subchannel-1-1)
Extended
HDTV
EDTV(or SDTV×2)
SDTV
LDTV
100Mbps
50
30
20
10Mbps
5
3
2
1Mbps
0.5
0
1000
2000
3000
4000
5000
Coverage Area (square miles)
Transfer Rate (Mbps)

FIG. 136

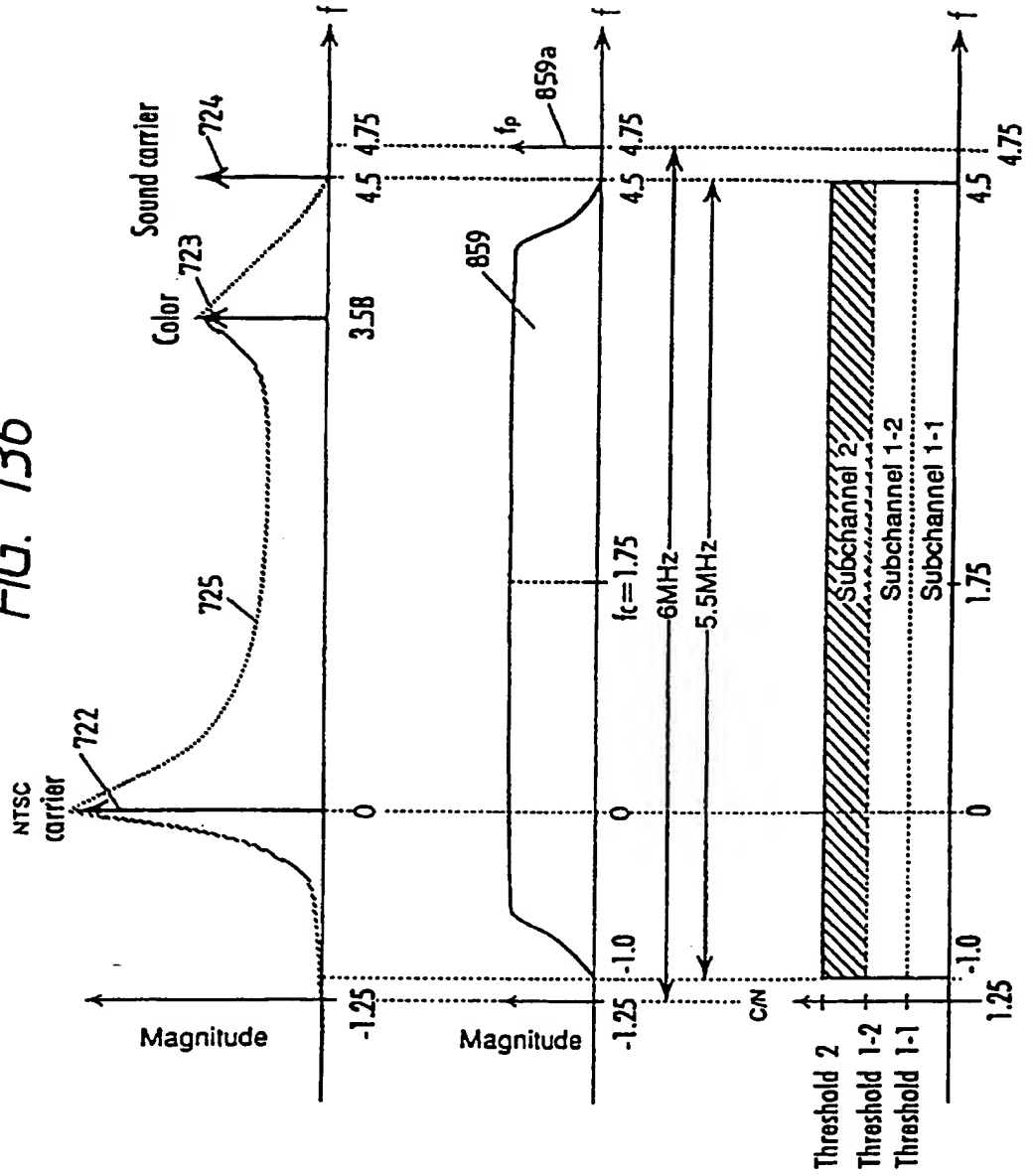

NTSC carrier
722
725
Color
723
Sound carrier
724
3.58
4.5
4.75
0
-1.25
Magnitude
859
859a
f_p
f_c=1.75
6MHz
5.5MHz
-1.0
C/N
Subchannel 2
Subchannel 1-2
Subchannel 1-1
1.75
1.25
Threshold 2
Threshold 1-2
Threshold 1-1
f

FIG. 137

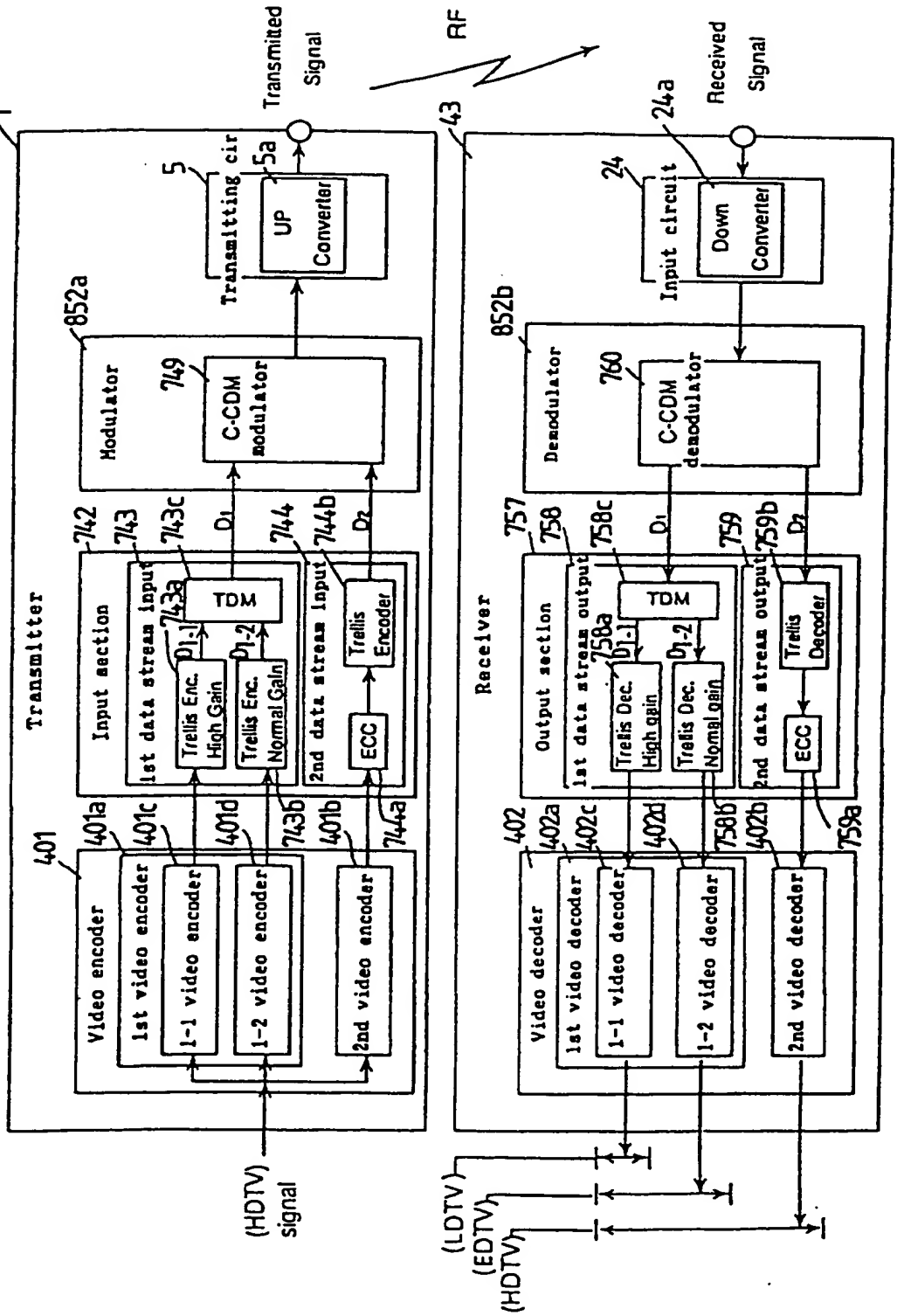

Transmitted Signal
RF
Received Signal
1
Transmitter
43
Receiver
5
Transmitting cir
5a
UP Converter
24a
24
Input circuit
Down Converter
852a
Modulator
749
C-CDM modulator
852b
Demodulator
760
C-CDM demodulator
742
743
743c
D1
744
744b
D2
757
758
758c
759
759b
Input section
1st data stream input
743a
D1-1
D1-2
TDM
Trellis Enc. High Gain
Trellis Enc. Normal Gain
2nd data stream input
Trellis Encoder
ECC
Output section
1st data stream output
758a
Trellis Dec. High gain
Trellis Dec. Nomal gain
2nd data stream output
Trellis Decoder
401
401a
401c
401d
743b
401b
744a
Video encoder
1st video encoder
1-1 video encoder
1-2 video encoder
2nd video encoder
402
402a
402c
402d
758b
402b
759a
Video decoder
1st video decoder
1-1 video decoder
1-2 video decoder
2nd video decoder
(HDTV) signal
(LDTV)
(EDTV)
(HDTV)

FIG. 138

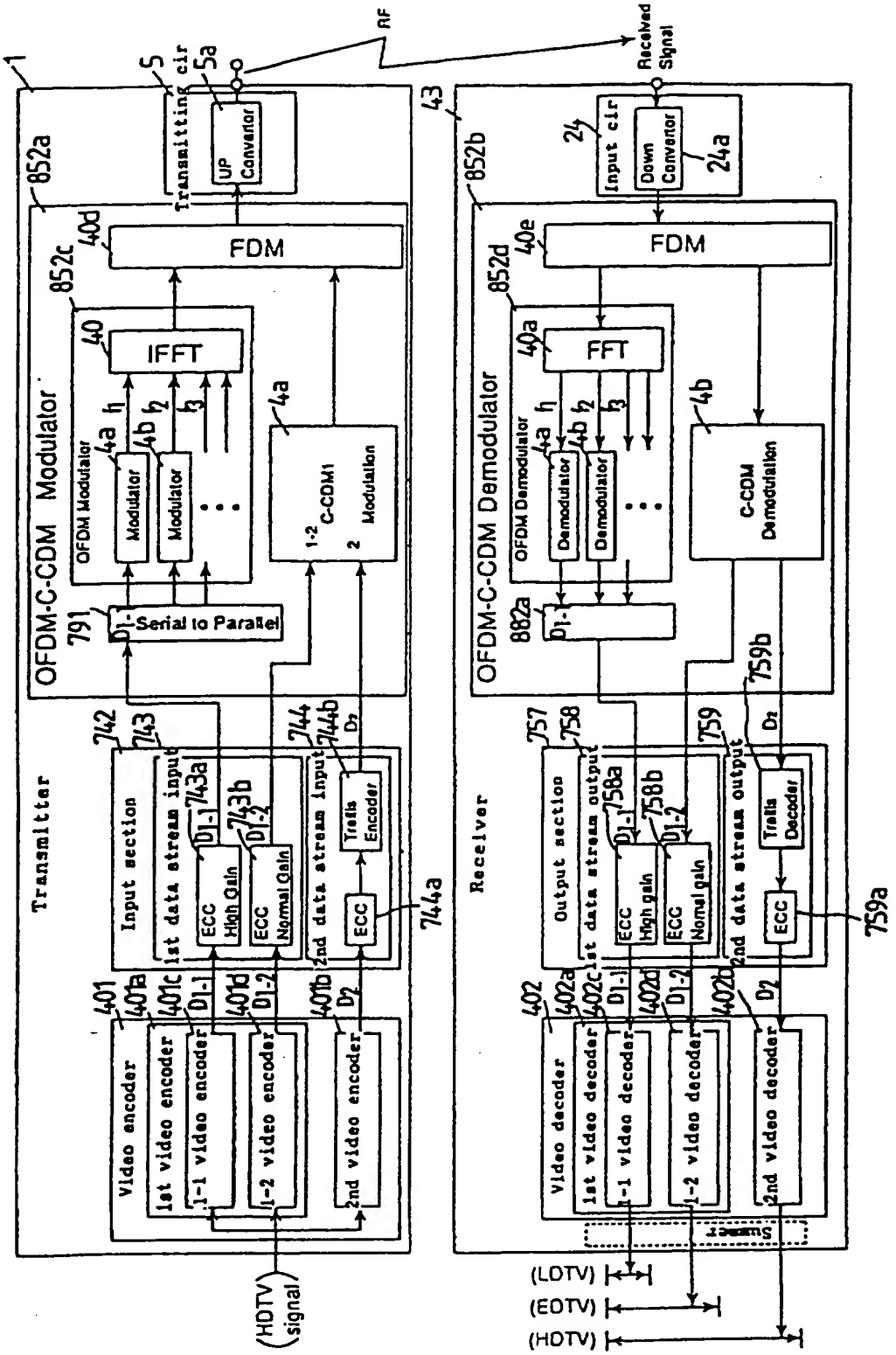

Transmitter
Receiver
OFDM-C-CDM Modulator
OFDM-C-CDM Demodulator
FDM
IFFT
FFT
Serial to Parallel
C-CDM Modulation
C-CDM Demodulation
Input section
Output section
1st data stream input
2nd data stream input
1st data stream output
2nd data stream output
ECC
High Gain
Normal Gain
Trellis Encoder
Trellis Decoder
Video encoder
Video decoder
1st video encoder
1-1 video encoder
1-2 video encoder
2nd video encoder
1st video decoder
1-1 video decoder
1-2 video decoder
2nd video decoder
Transmitting cir
Input cir
UP Convertor
Down Convertor
RF
Received Signal
(HDTV signal)
(LDTV)
(EDTV)
(HDTV)

FIG. 139

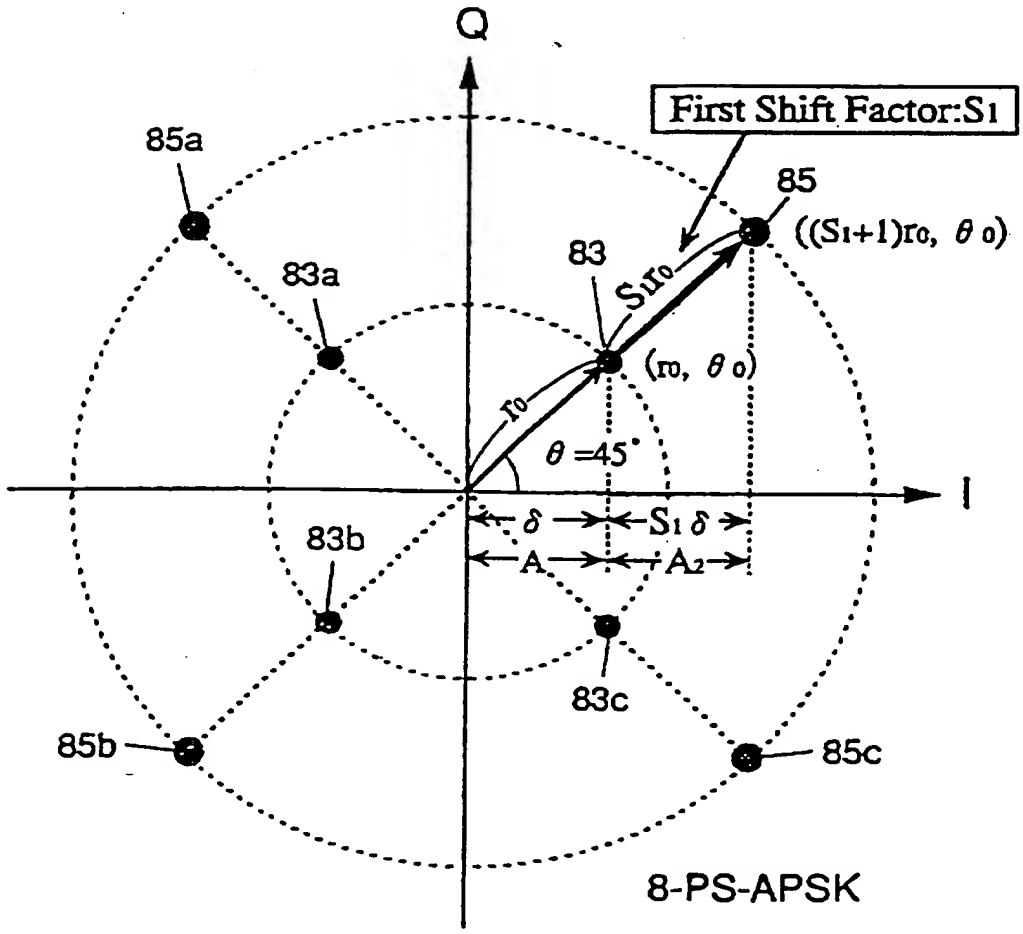

Q
I
First Shift Factor:S1
85a
85
((S1+1)r0, θ 0)
83
83a
S1r0
(r0, θ 0)
r0
θ =45°
δ
S1 δ
A
A2
83b
83c
85b
85c
8-PS-APSK

FIG. 140

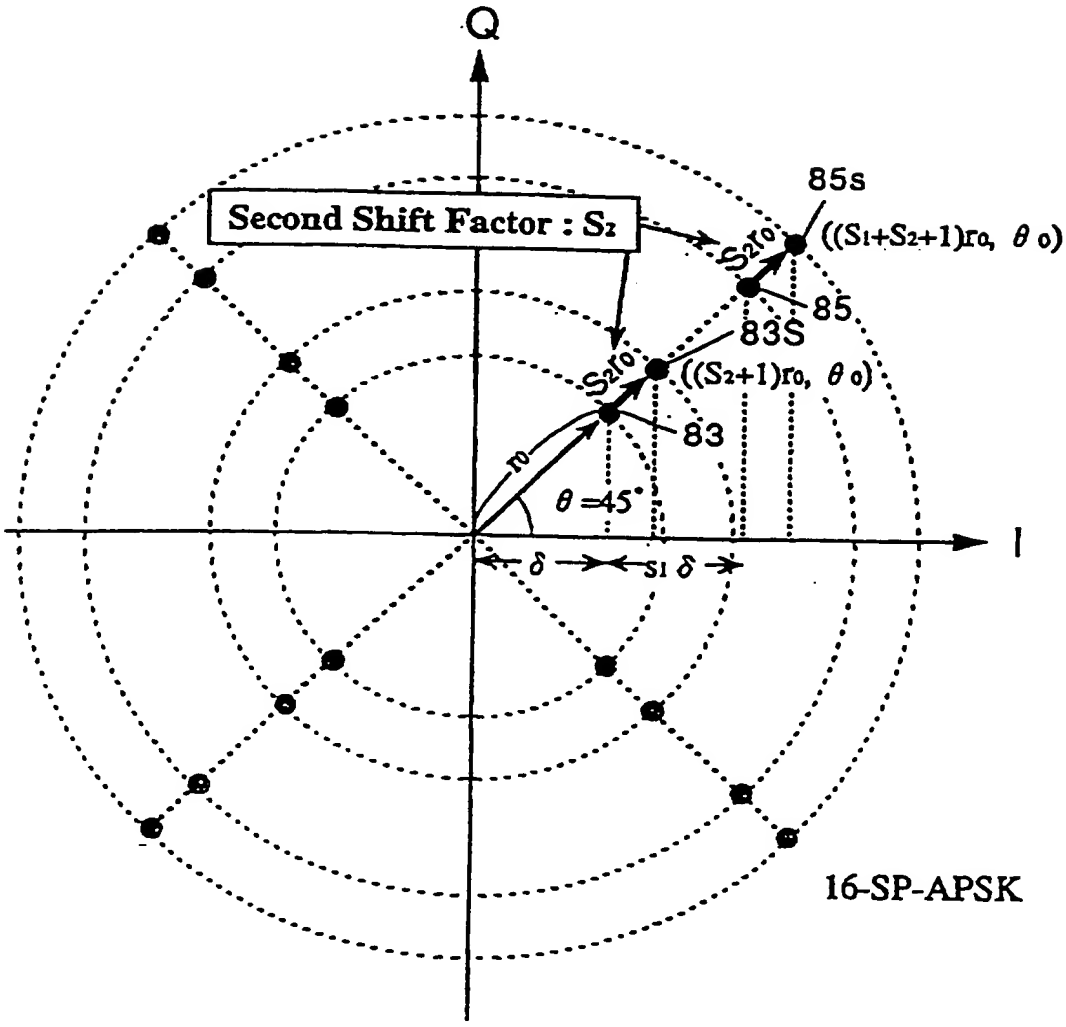

Q
I
Second Shift Factor : S2
85s
((S1+S2+1)r0, θ0)
85
83S
((S2+1)r0, θ0)
83
r0
θ=45°
δ
S1 δ
16-SP-APSK

FIG. 141

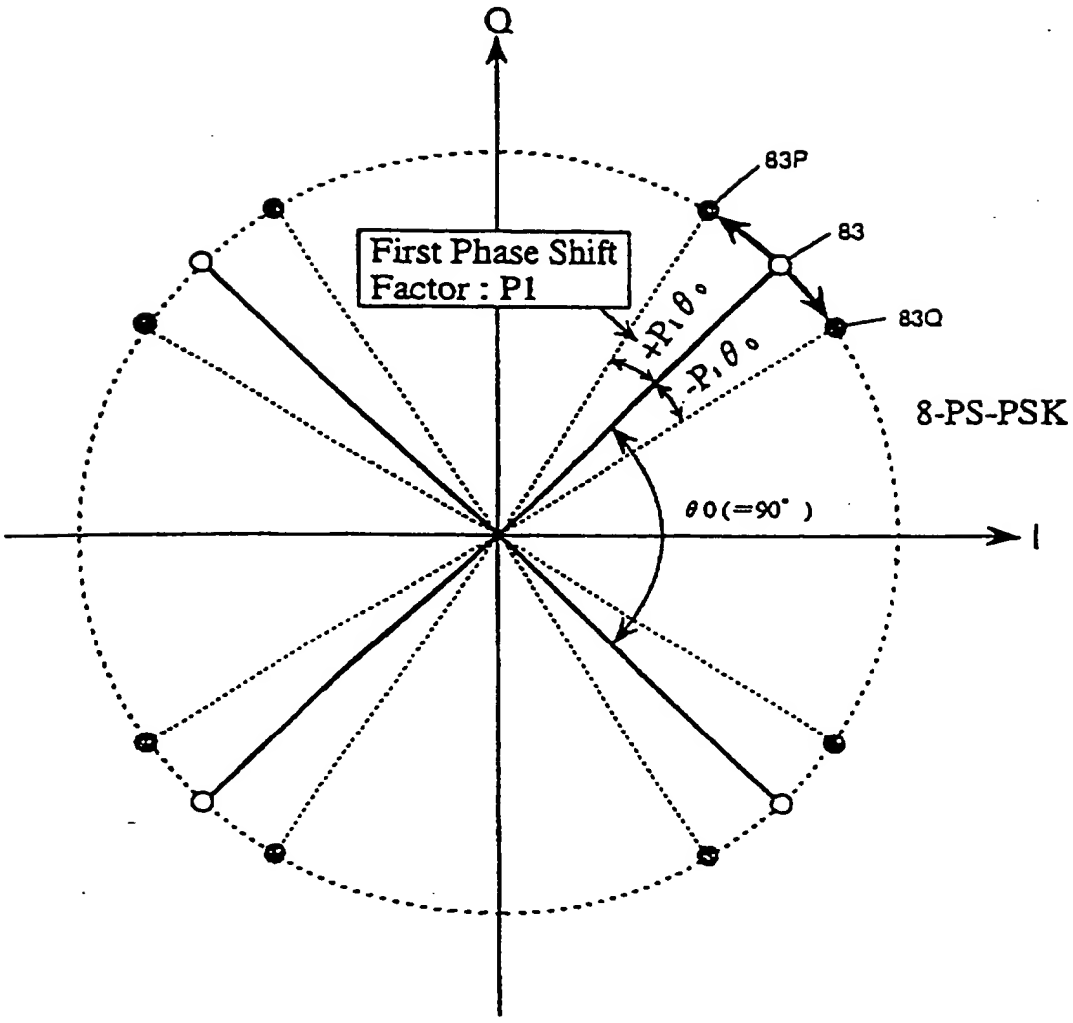
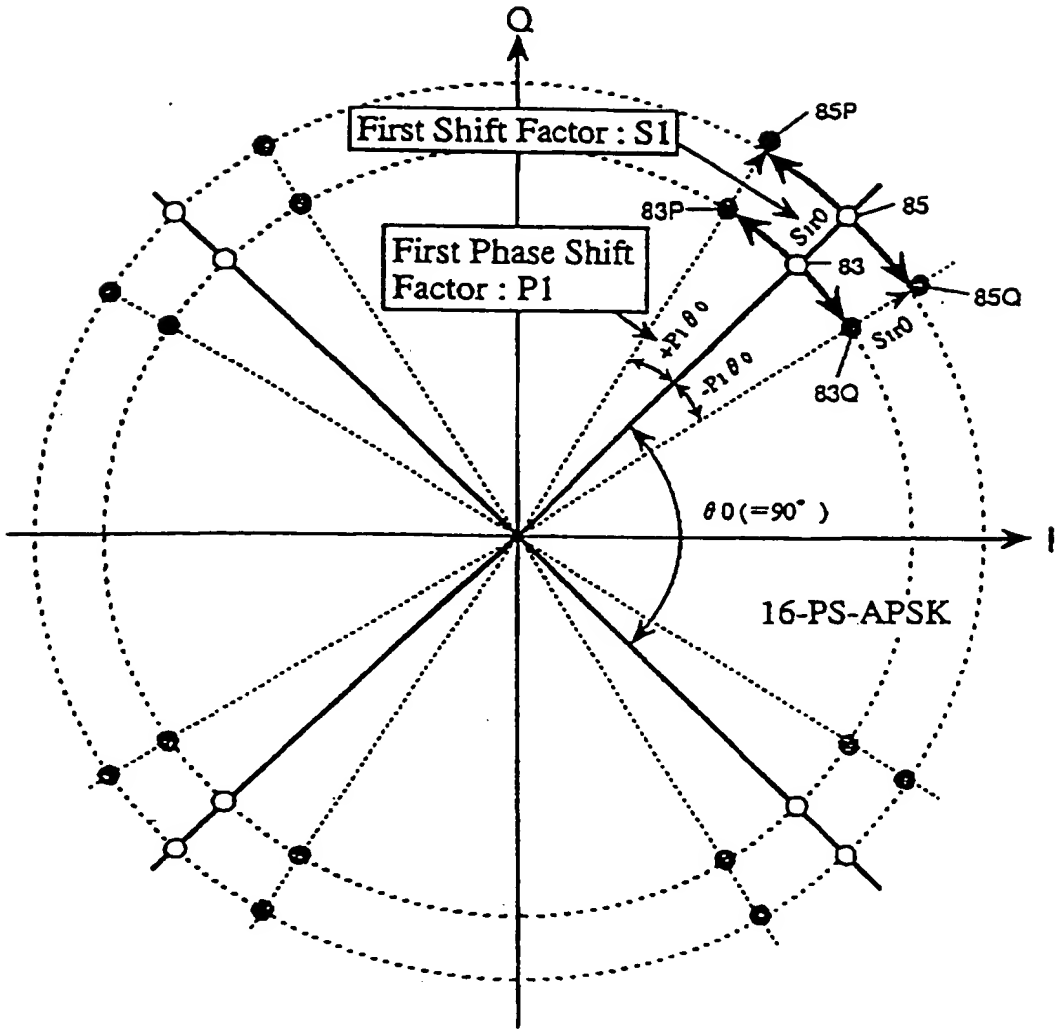


FIG. 142


Q
I
First Shift Factor : S1
First Phase Shift Factor : P1
85P
85
83P
83
85Q
83Q
S1sinθ
S1sinθ
+P1θ0
-P1θ0
θ0(=90°)
16-PS-APSK

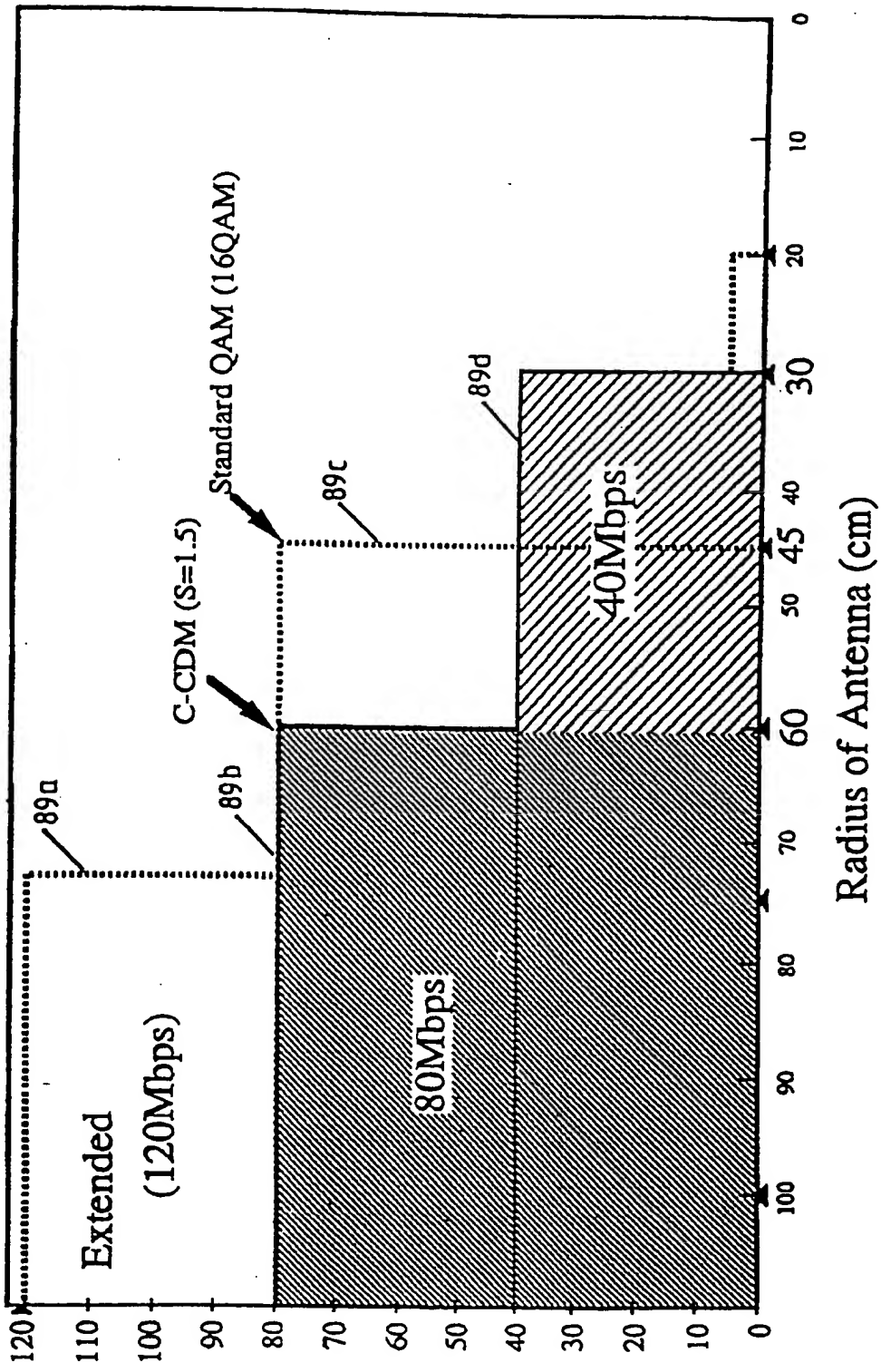

Transfer Rate [Mbps]
120
110
100
90
80
70
60
50
40
30
20
10
0
Extended
(120Mbps)
80Mbps
40Mbps
C-CDM (S=1.5)
Standard QAM (16QAM)
89a
89b
89c
89d
0
10
20
30
40
45
50
60
70
80
90
100
Radius of Antenna (cm)

FIG. 143

FIG. 144

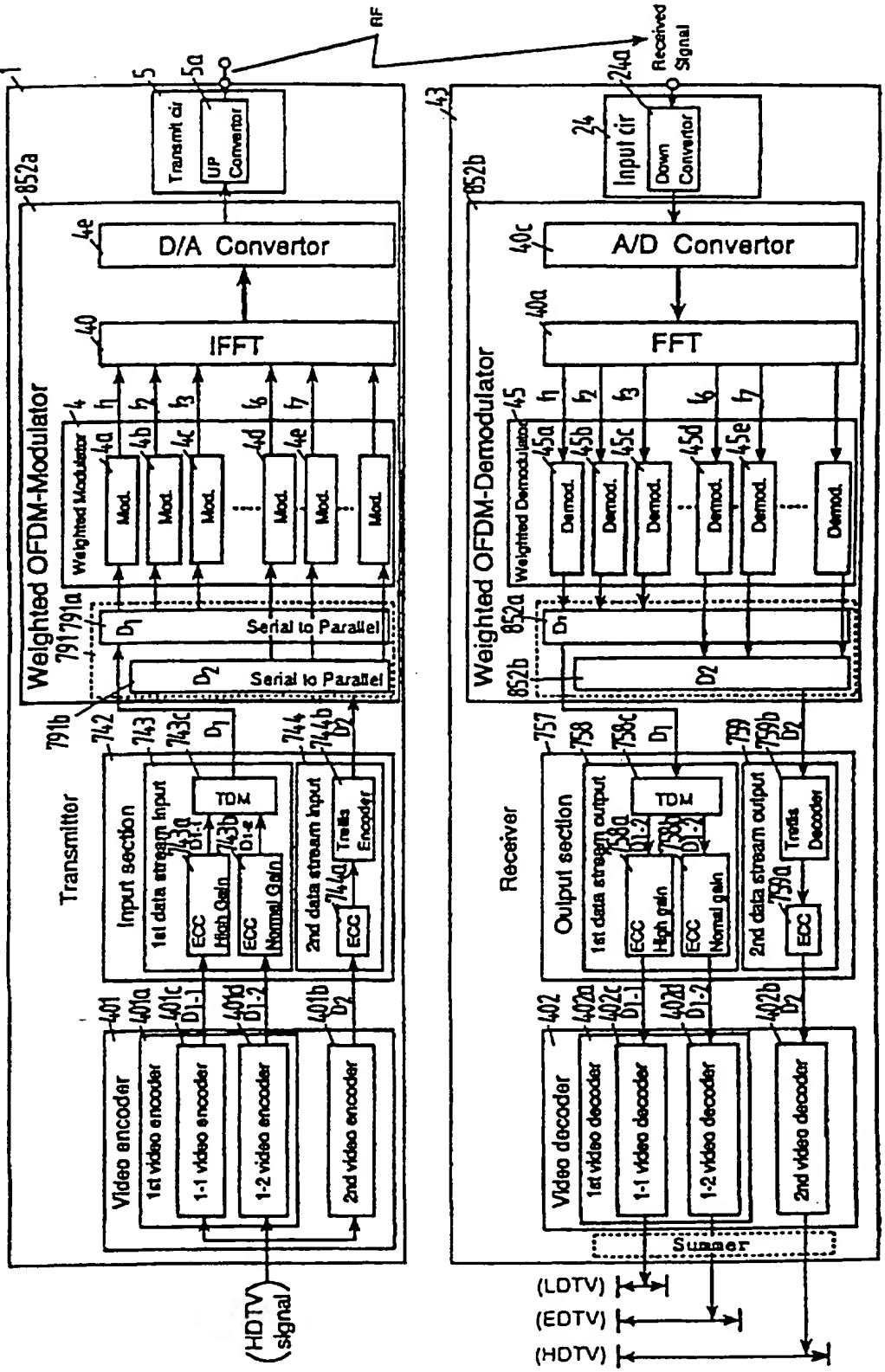

RF
Received Signal
Transmitter
Receiver
Weighted OFDM-Modulator
Weighted OFDM-Demodulator
Transmit circ
UP Convertor
Input circ
Down Convertor
D/A Convertor
A/D Convertor
IFFT
FFT
Weighted Modulator
Weighted Demodulator
Mod.
Demod.
Serial to Parallel
Input section
Output section
1st data stream input
2nd data stream input
1st data stream output
2nd data stream output
TDM
ECC
High Gain
Normal Gain
Trellis Encoder
Trellis Decoder
Video encoder
Video decoder
1st video encoder
1-1 video encoder
1-2 video encoder
2nd video encoder
1st video decoder
2nd video decoder
Summer
(HDTV signal)
(LDTV)
(EDTV)
(HDTV)

FIG. 145(a)

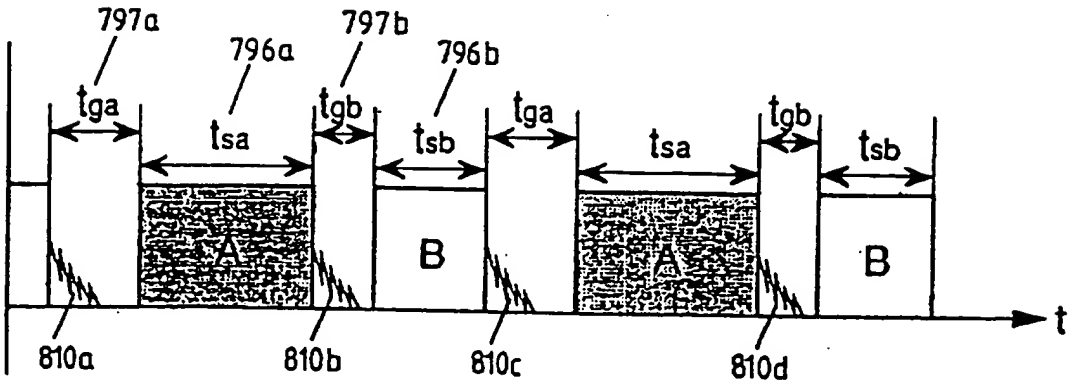
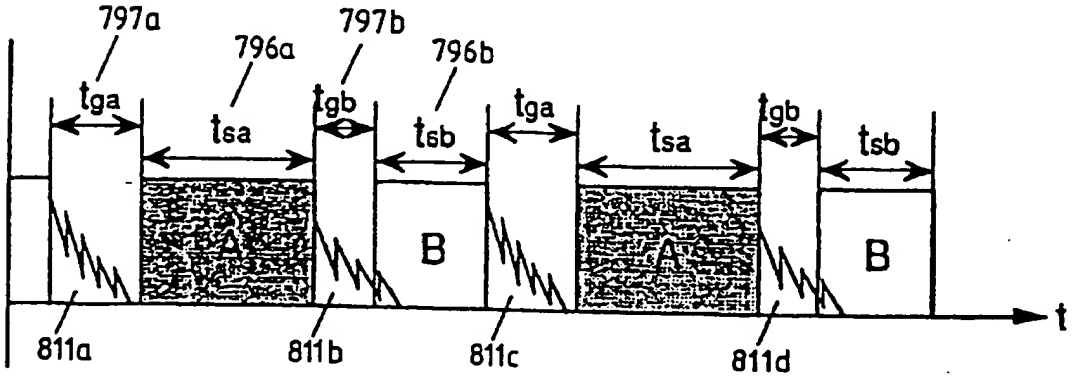


FIG. 145(b)



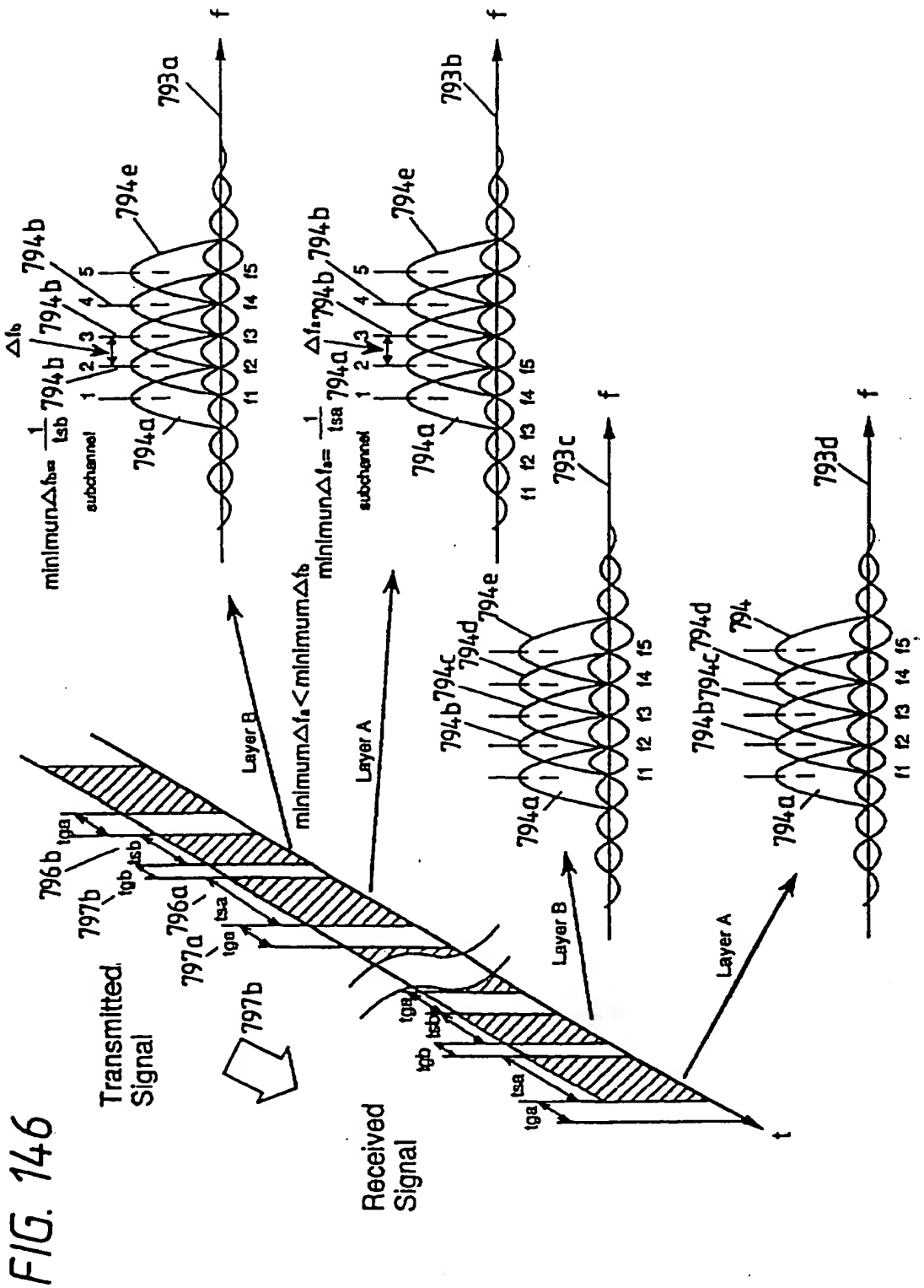

793a
793b
793c
793d
794a
794b
794c
794d
794e
796a
796b
797a
797b
f
t
Layer A
Layer B
Transmitted Signal
Received Signal
subchannel
11 12 13 14 15

FIG. 146

FIG. 147

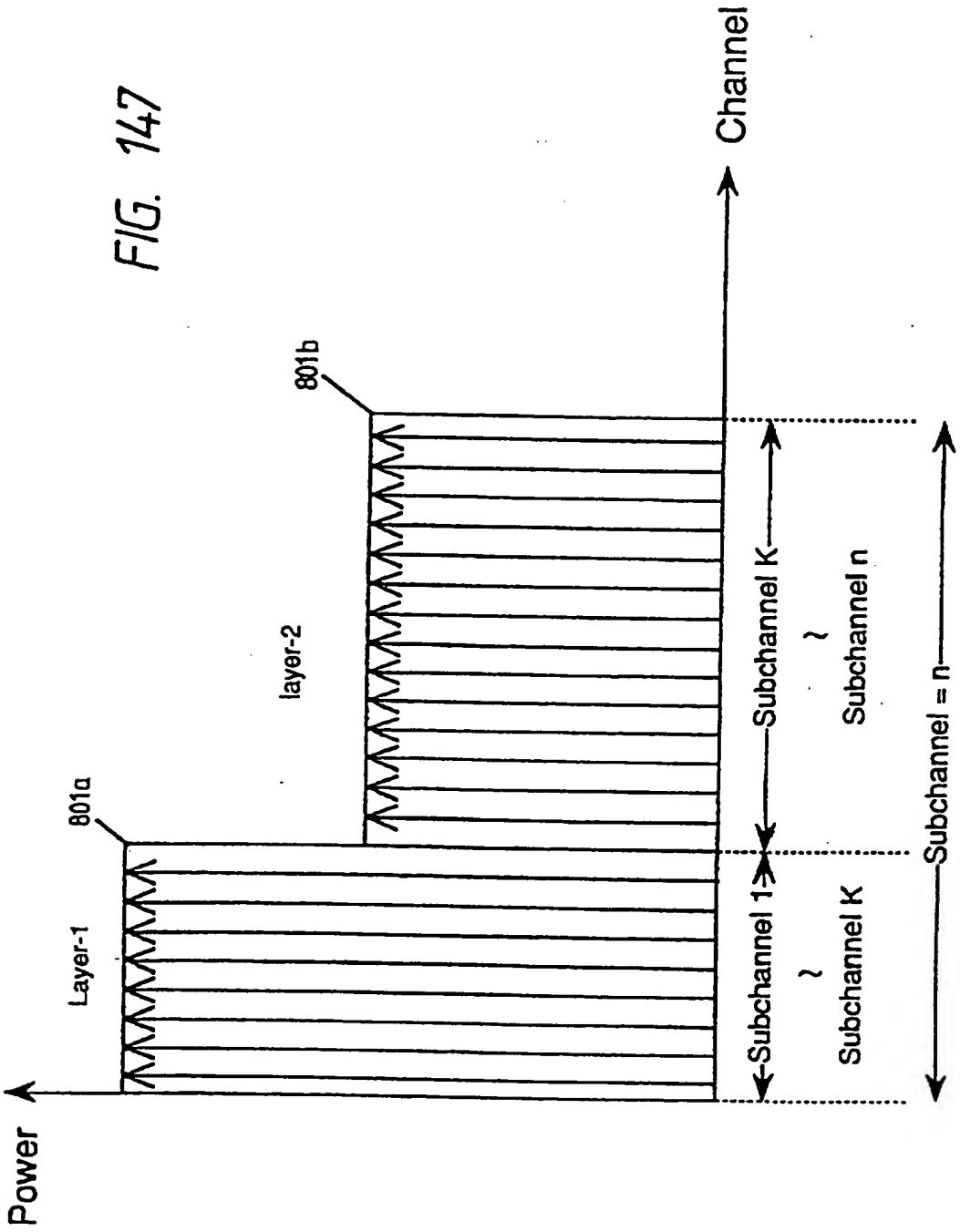
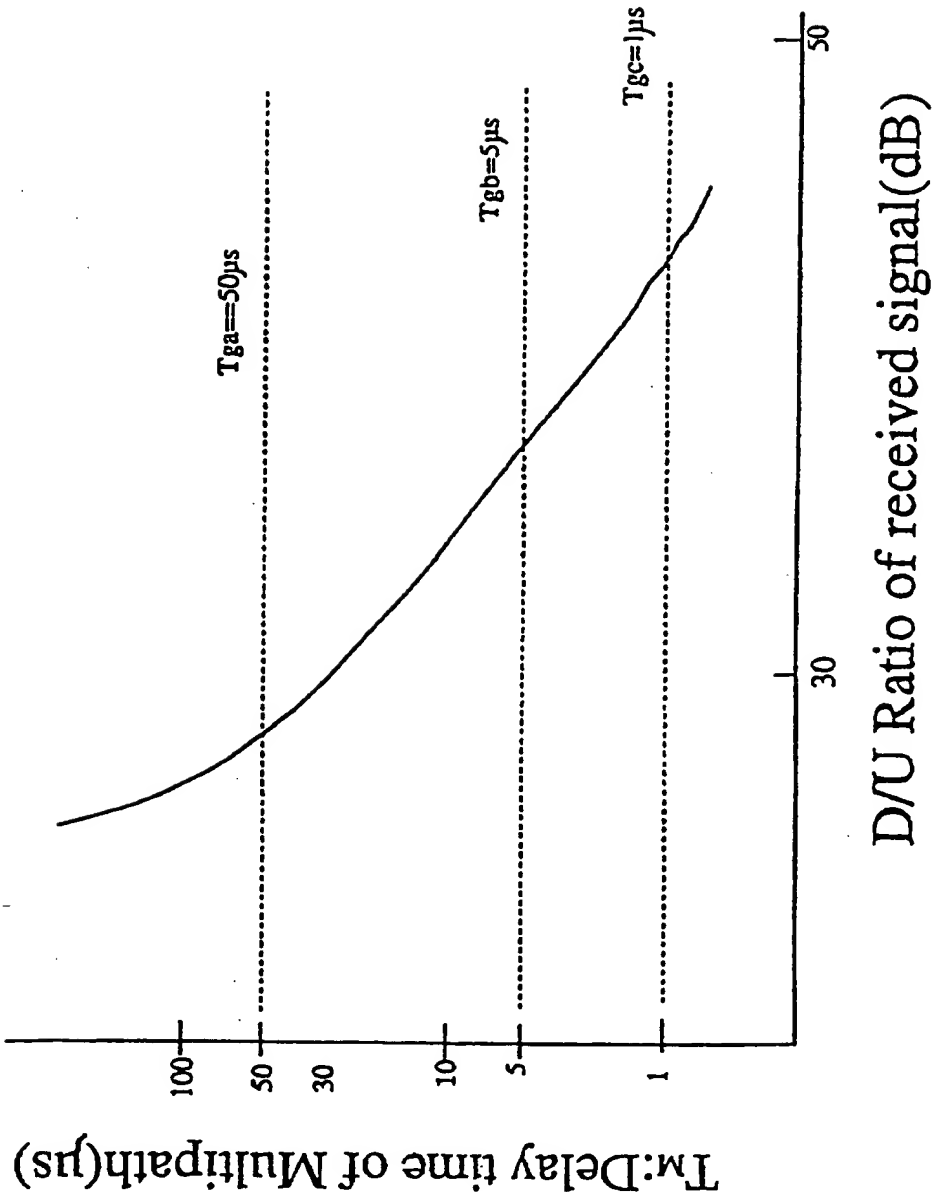

Channel
801b
layer-2
801a
Layer-1
Power
Subchannel K
~
Subchannel n
Subchannel 1
~
Subchannel K
Subchannel = n

FIG. 148


Tga=50μs
Tgb=5μs
Tgc=1μs
100
50
30
10
5
1
Tm:Delay time of Multipath(μs)
50
30
D/U Ratio of received signal(dB)

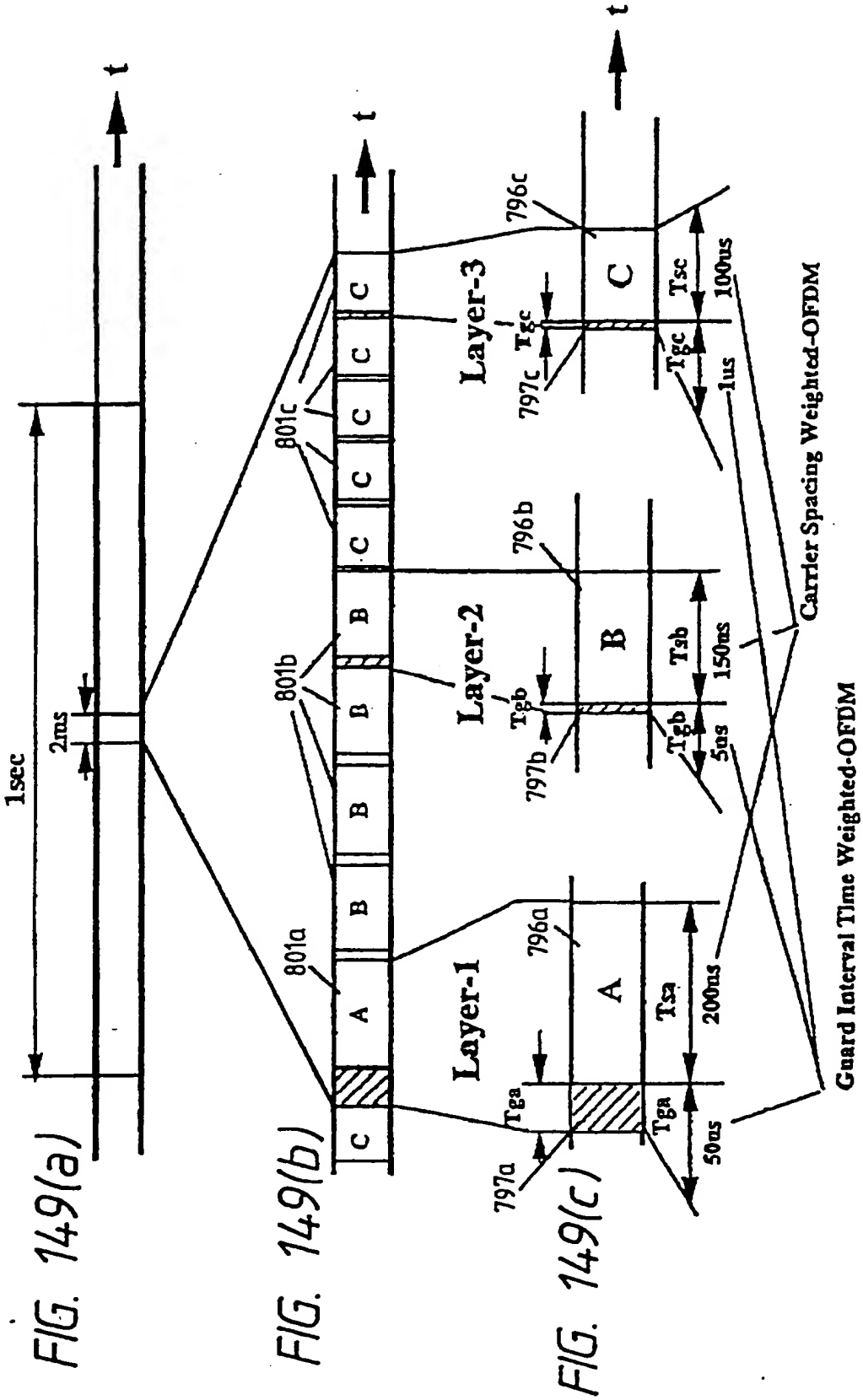

t
1sec
2ms
FIG. 149(a)
801a
801b
801c
A
B
C
Layer-1
Layer-2
Layer-3
FIG. 149(b)
796a
796b
796c
797a
797b
797c
Tga
Tgb
Tgc
Tsa
Tsb
Tsc
200ms
150ms
100us
50us
5us
1us
Carrier Spacing Weighted-OFDM
Guard Interval Time Weighted-OFDM
FIG. 149(c)

FIG. 150

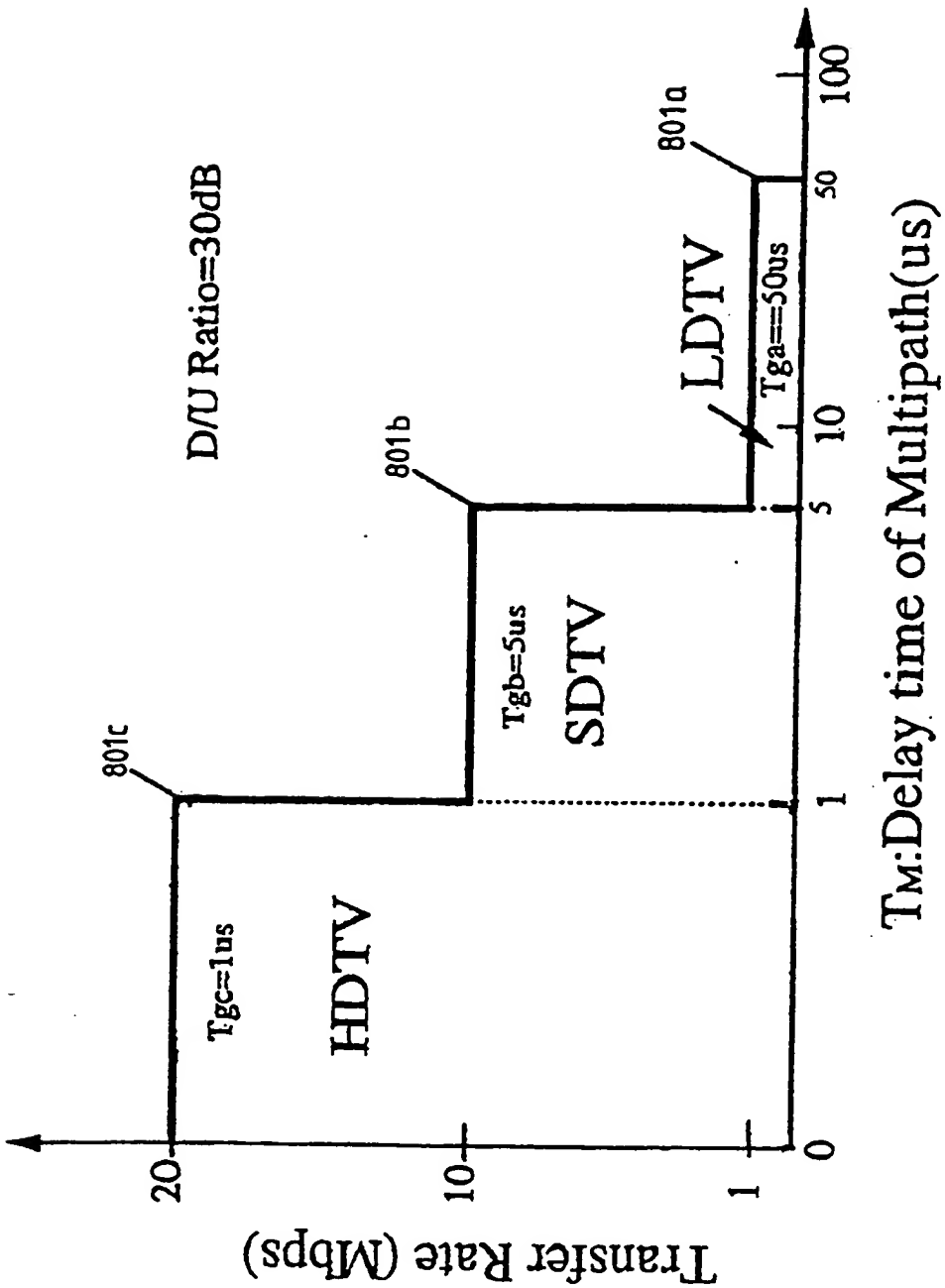

D/U Ratio=30dB
801a
801b
801c
LDTV
Tga==50us
SDTV
Tgb=5us
HDTV
Tgc=1us
Transfer Rate (Mbps)
20
10
1
0
1
5
10
50
100
TM:Delay time of Multipath(us)

FIG. 151

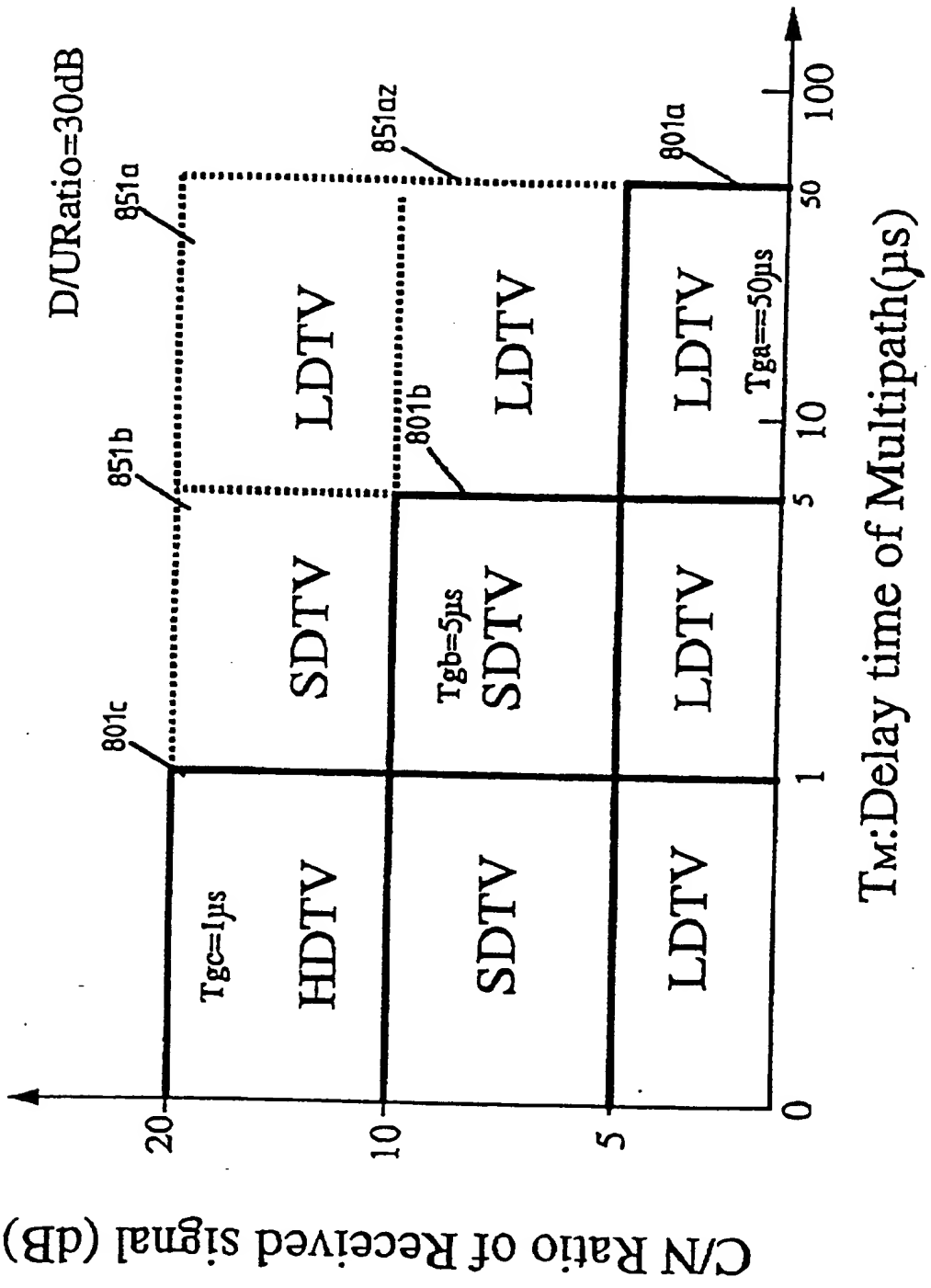
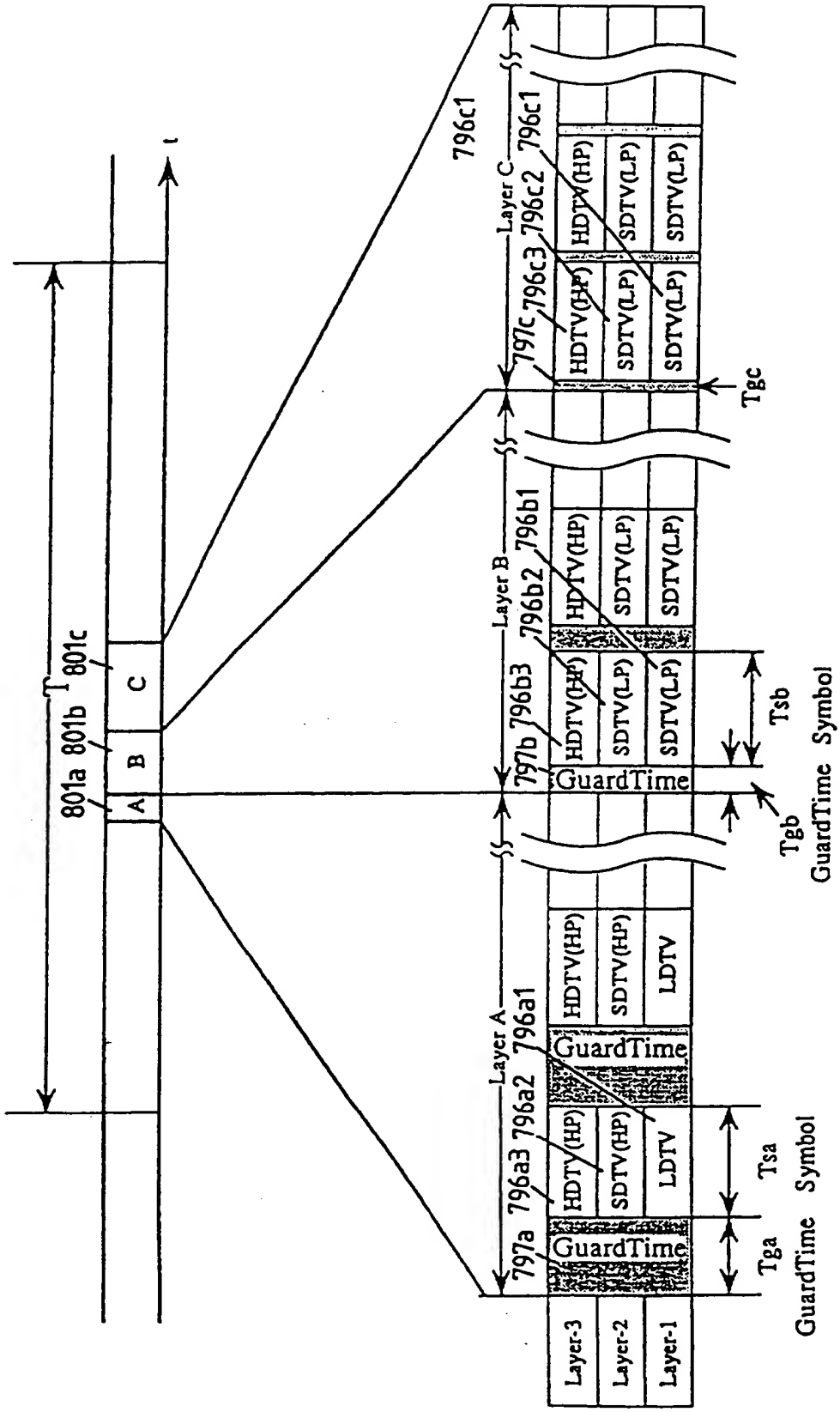

D/URatio=30dB
851a
851az
851b
801a
801b
801c
Tga==50μs
Tgb=5μs
Tgc=1μs
LDTV
SDTV
HDTV
20
10
5
0
1
5
10
50
100
C/N Ratio of Received signal (dB)
TM:Delay time of Multipath(μs)

FIG. 152


T
801a
801b
801c
A
B
C
t
796c1
Layer C
796c2
796c3
797c
HDTV(HP)
SDTV(LP)
SDTV(LP)
Tgc
Layer B
796b1
796b2
796b3
797b
HDTV(HP)
SDTV(LP)
SDTV(LP)
Tsb
GuardTime
Tgb
GuardTime Symbol
Layer A
796a1
796a2
796a3
797a
HDTV(HP)
SDTV(HP)
LDTV
GuardTime
HDTV(HP)
SDTV(HP)
LDTV
Tsa
GuardTime
Tga
GuardTime Symbol
Layer-3
Layer-2
Layer-1

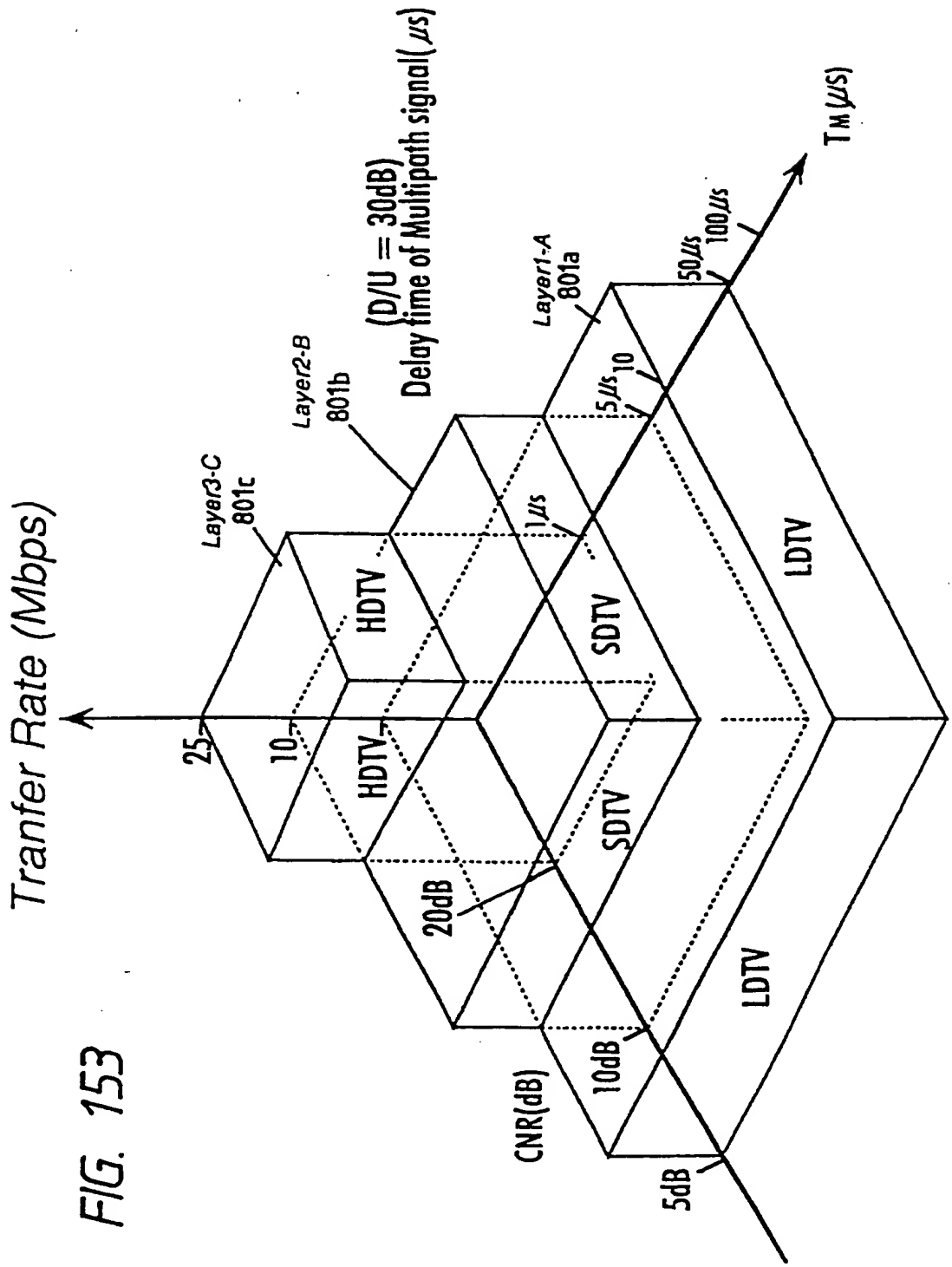

Tranfer Rate (Mbps)
25
10
HDTV
HDTV
SDTV
SDTV
LDTV
LDTV
Layer3-C
801c
Layer2-B
801b
Layer1-A
801a
(D/U = 30dB)
Delay time of Multipath signal(μs)
1μs
5μs
10
50μs
100μs
TM(μs)
20dB
10dB
5dB
CNR(dB)

FIG. 153

FIG. 154

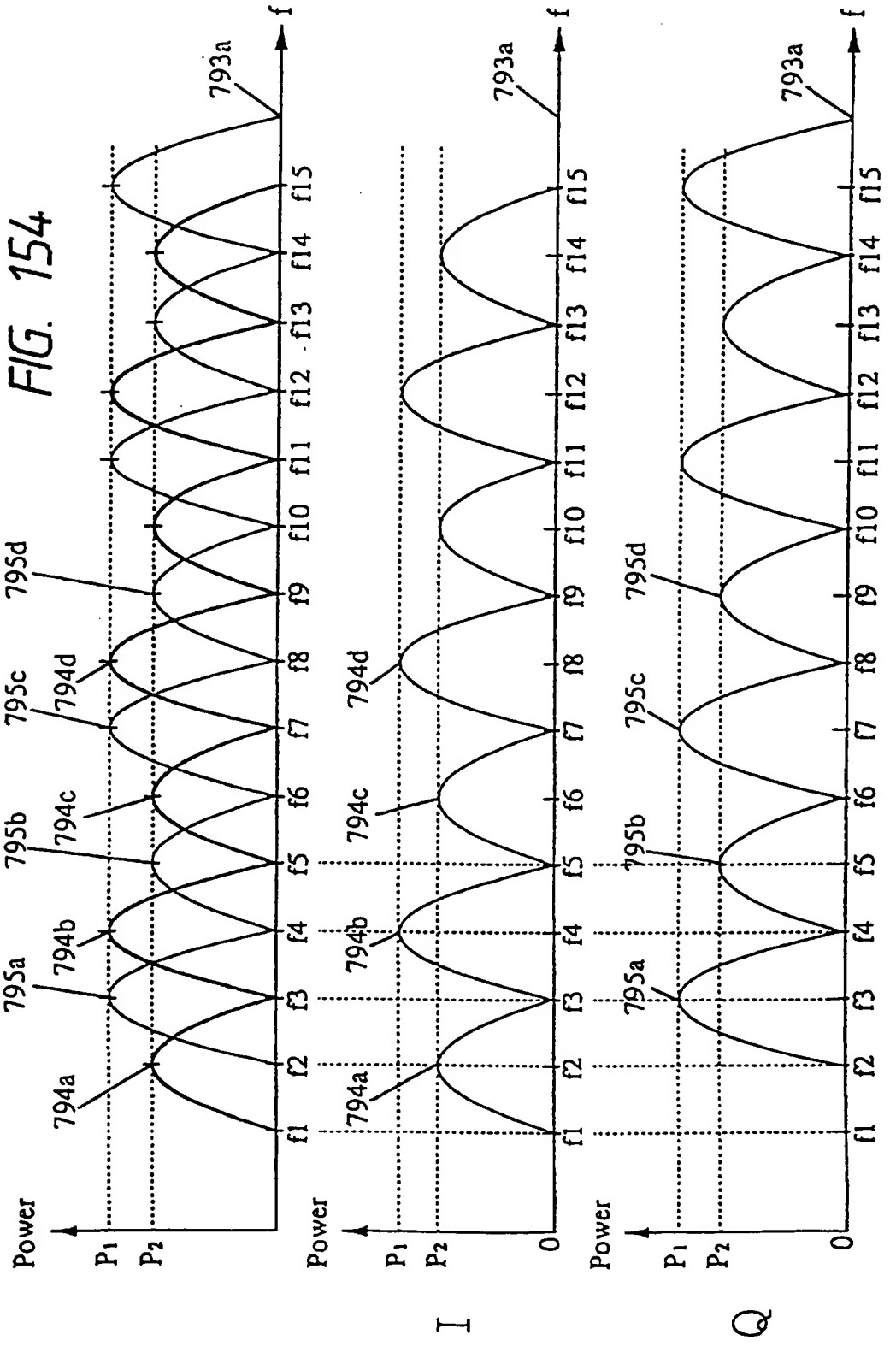

Power
P1
P2
0
f
f1
f2
f3
f4
f5
f6
f7
f8
f9
f10
f11
f12
f13
f14
f15
793a
794a
794b
794c
794d
795a
795b
795c
795d
I
Q

FIG. 155

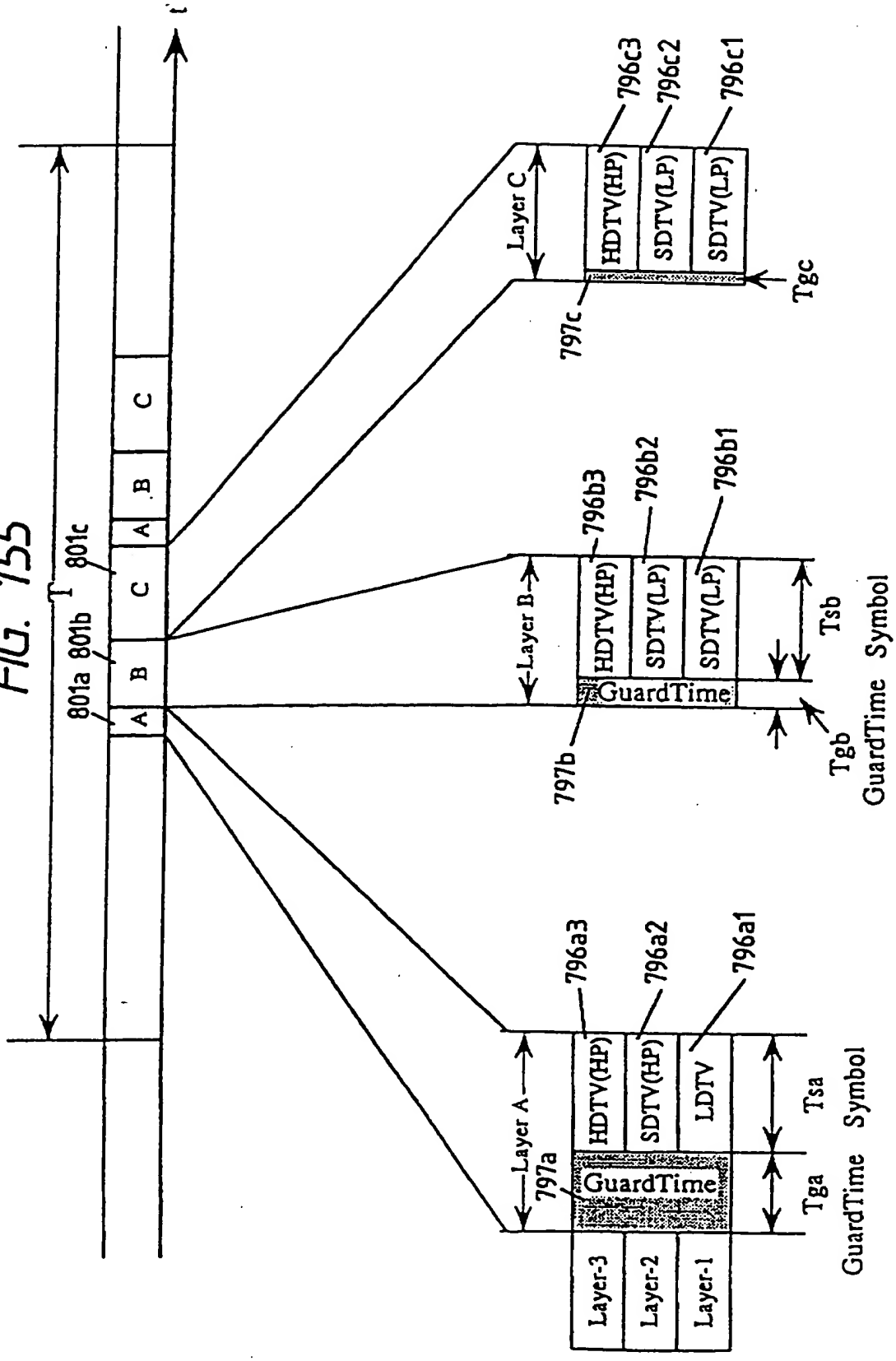

t
A
B
C
801a
801b
801c
T
Layer A
Layer B
Layer C
796a3
796a2
796a1
796b3
796b2
796b1
796c3
796c2
796c1
HDTV(HP)
SDTV(HP)
LDTV
SDTV(LP)
GuardTime
797a
797b
797c
Tga
Tgb
Tgc
Tsa
Tsb
GuardTime Symbol
Layer-3
Layer-2
Layer-1

FIG. 156

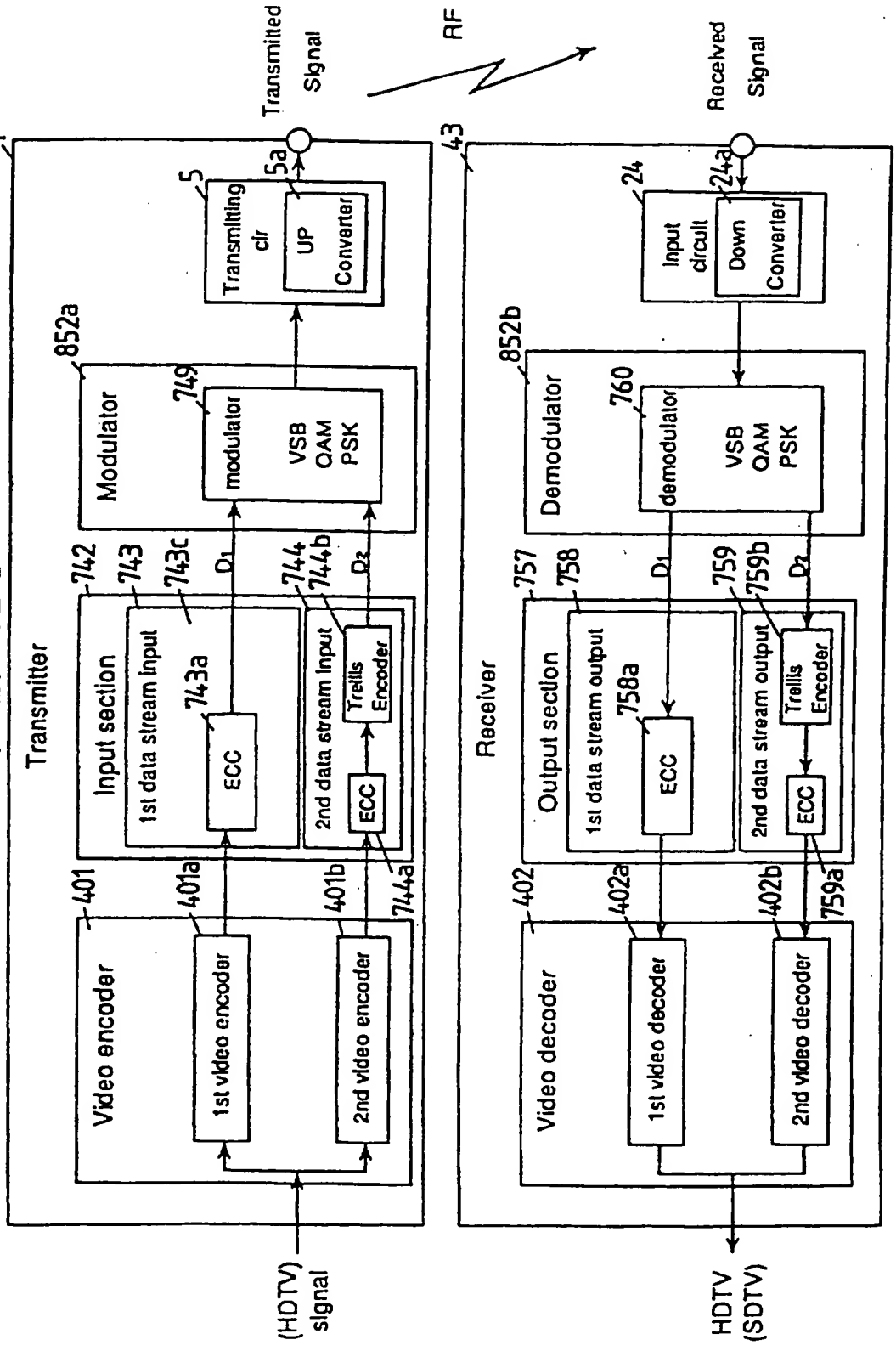

Transmitted Signal
RF
Received Signal
Transmitter
Receiver
Video encoder
1st video encoder
2nd video encoder
Input section
1st data stream input
2nd data stream input
ECC
Trellis Encoder
Modulator
modulator
VSB QAM PSK
Transmitting clr
UP Converter
Video decoder
1st video decoder
2nd video decoder
Output section
1st data stream output
2nd data stream output
Demodulator
demodulator
Input circuit
Down Converter
(HDTV) signal
HDTV (SDTV)

FIG. 157

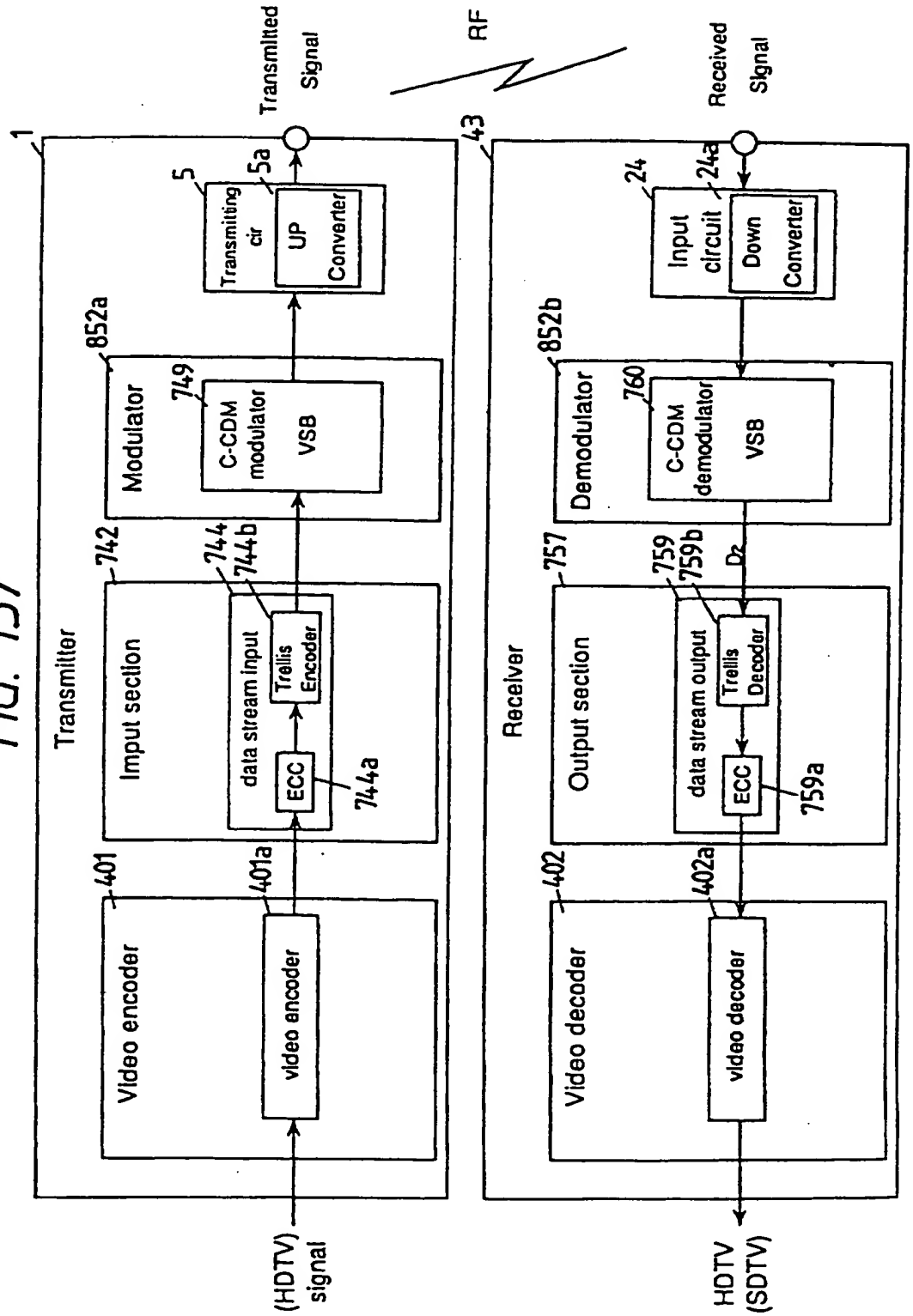
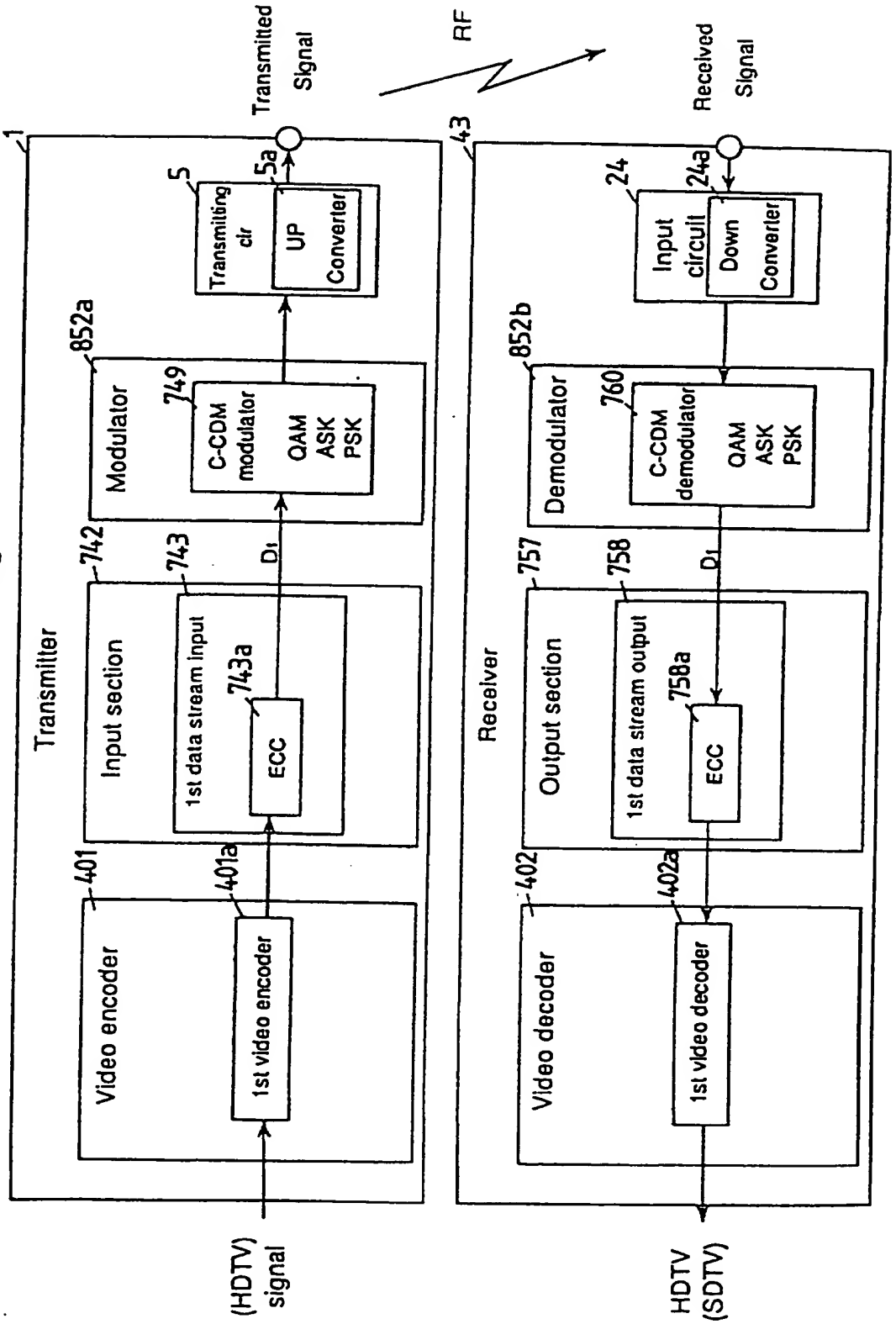

Transmitted Signal
RF
Received Signal
1
43
Transmitter
Receiver
5
Transmitting cir
5a
UP Converter
24
Input circuit
24a
Down Converter
852a
Modulator
749
C-CDM modulator
VSB
852b
Demodulator
760
C-CDM demodulator
VSB
742
Input section
744
744b
data stream input
Trellis Encoder
ECC
744a
757
Output section
759
759b
D2
data stream output
Trellis Decoder
ECC
759a
401
Video encoder
401a
video encoder
402
Video decoder
402a
video decoder
(HDTV) signal
HDTV (SDTV)

FIG. 158


Transmitted Signal
RF
Received Signal
1
Transmitter
Video encoder
401
1st video encoder
401a
Input section
742
1st data stream input
743
ECC
743a
Modulator
852a
C-CDM modulator
749
QAM ASK PSK
Transmitting cir
5
UP Converter
5a
(HDTV) signal
43
Receiver
Video decoder
402
1st video decoder
402a
Output section
757
1st data stream output
758
ECC
758a
Demodulator
852b
C-CDM demodulator
760
QAM ASK PSK
Input circuit
24
Down Converter
24a
HDTV (SDTV)

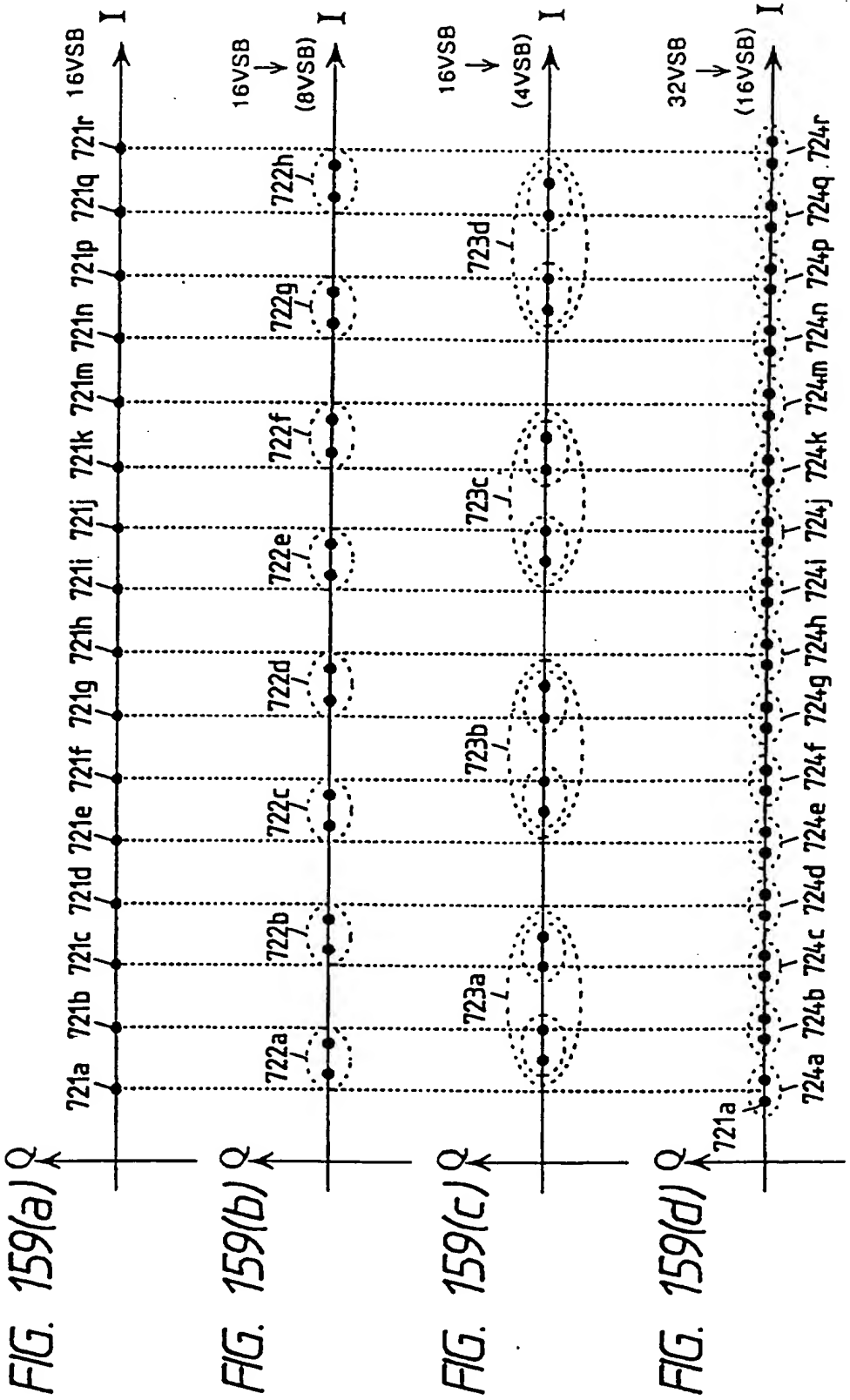


FIG. 159(a)

FIG. 159(b)

FIG. 159(c)

FIG. 159(d)

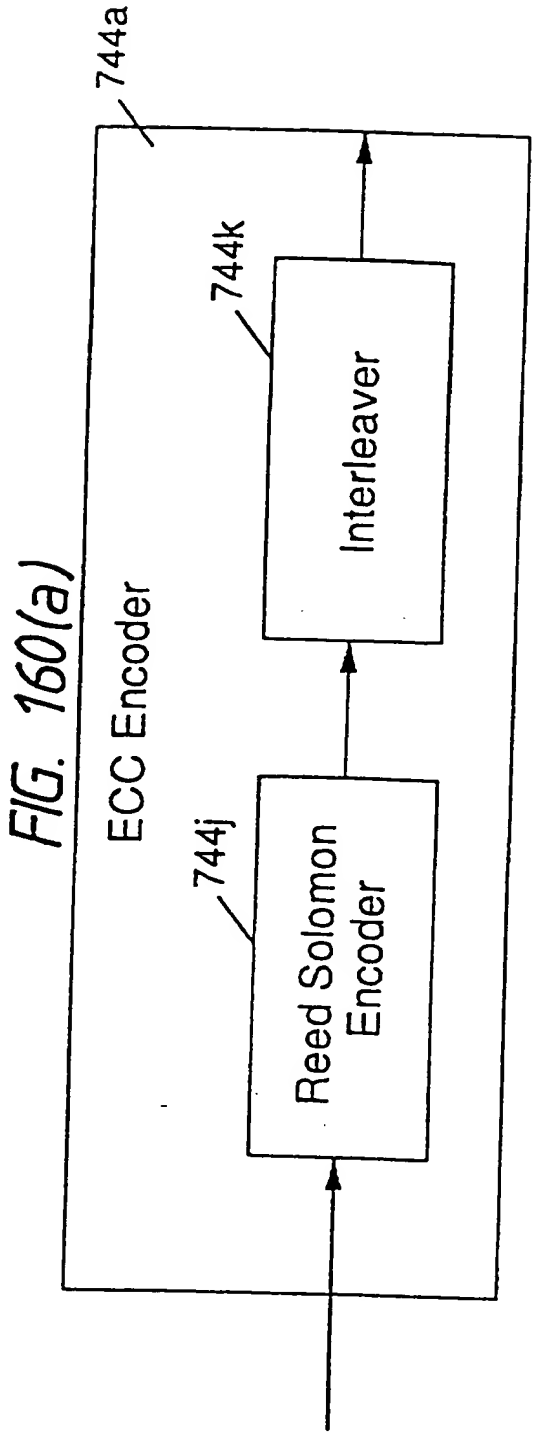


FIG. 160(a)

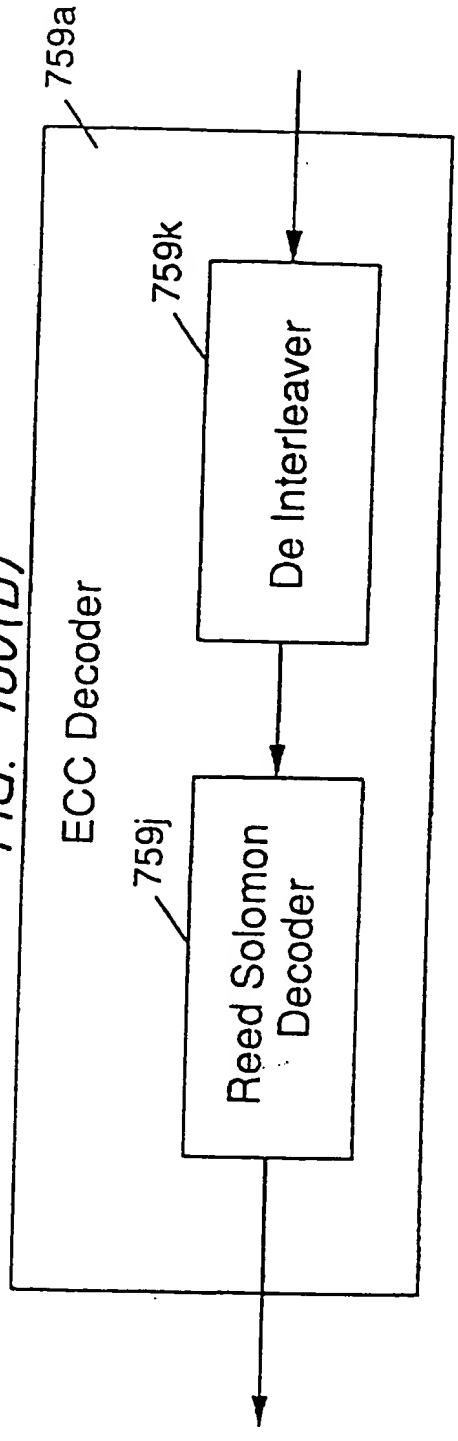


FIG. 160(b)

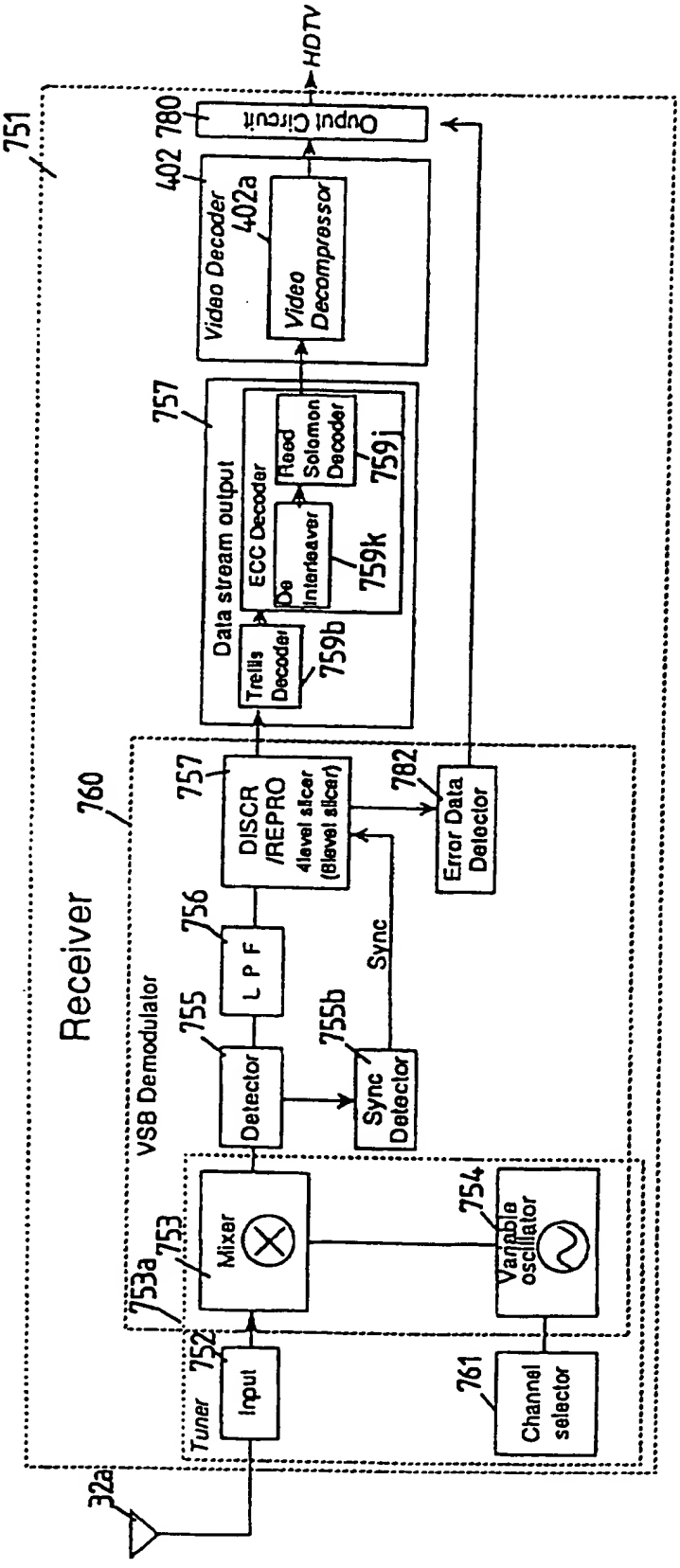

HDTV
751
Output Circuit
780
402
Video Decoder
402a
Video Decompressor
757
Data stream output
ECC Decoder
Read Solomon Decoder
759j
De Interleaver
759k
Trellis Decoder
759b
Receiver
760
757
DISCR /REPRO
4level slicer
(8level slicer)
782
Error Data Detector
Sync
756
L P F
755
Detector
755b
Sync Detector
VSB Demodulator
753a
753
Mixer
754
Variable oscillator
Tuner
752
Input
761
Channel selector
32a

FIG. 161

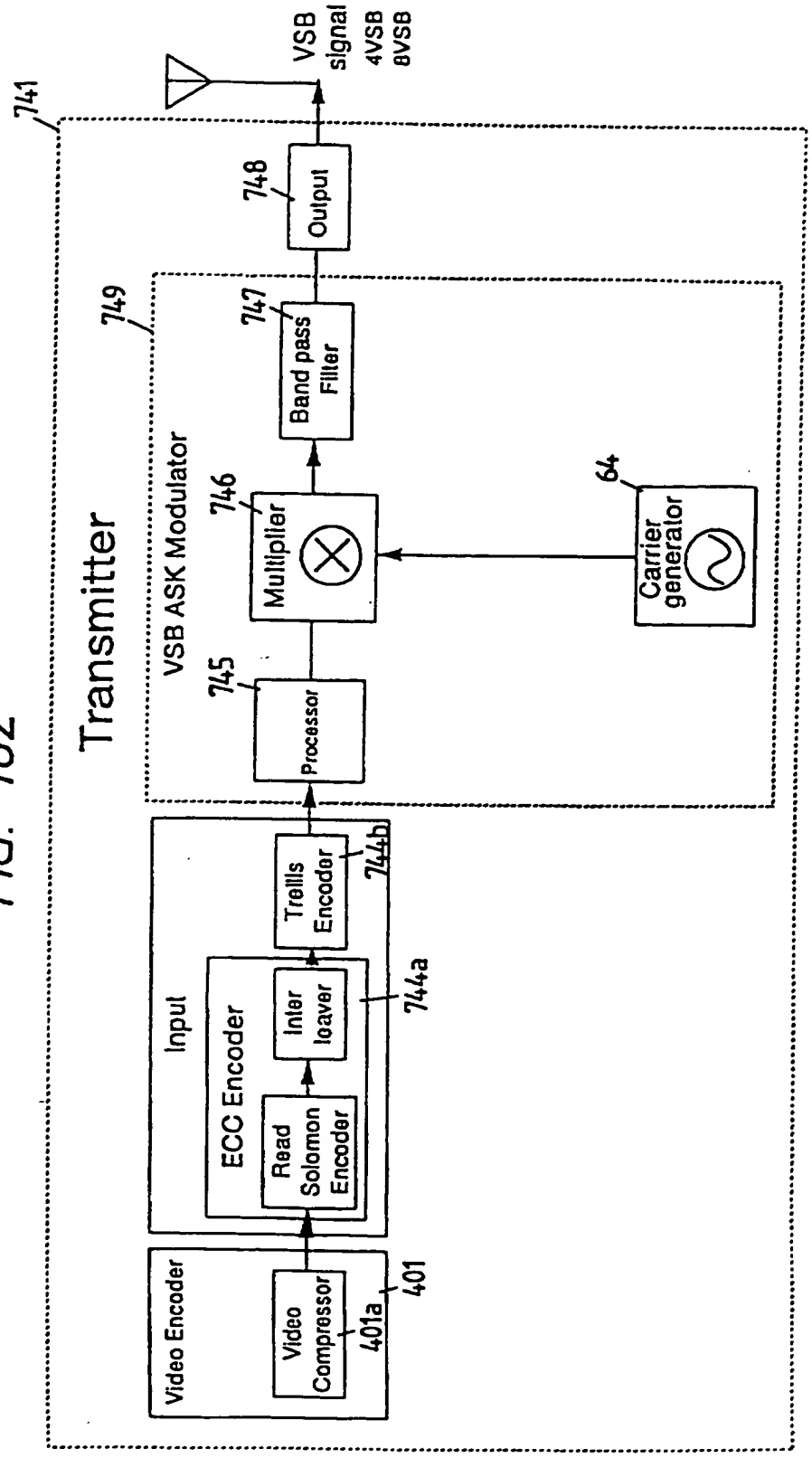

VSB signal
4VSB
8VSB
741
748
Output
749
747
Band pass Filter
746
Multiplier
64
Carrier generator
745
Processor
Transmitter
VSB ASK Modulator
Input
744b
Trellis Encoder
744a
ECC Encoder
Inter leaver
Read Solomon Encoder
401
Video Encoder
401a
Video Compressor

FIG. 162

FIG. 163

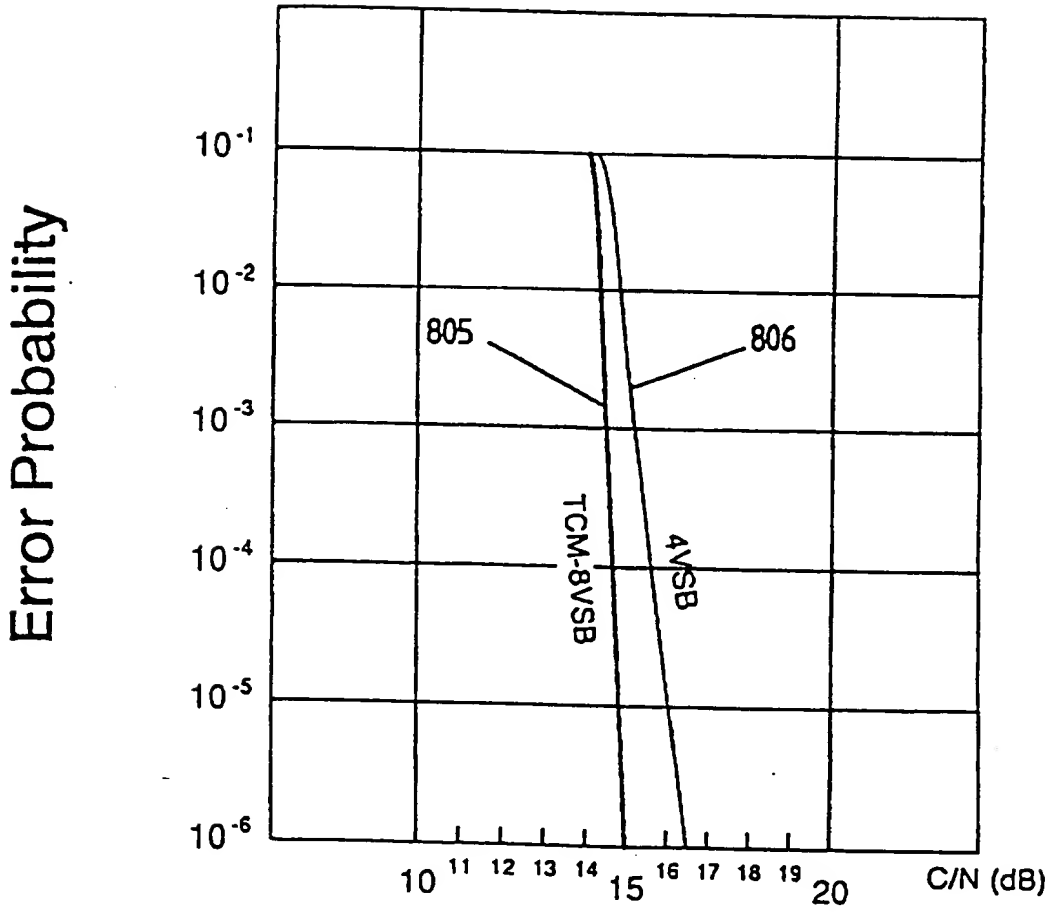

Error Probability
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
10^{-6}
805
806
TCM-8VSB
4VSB
10 11 12 13 14 15 16 17 18 19 20
C/N (dB)

FIG. 164

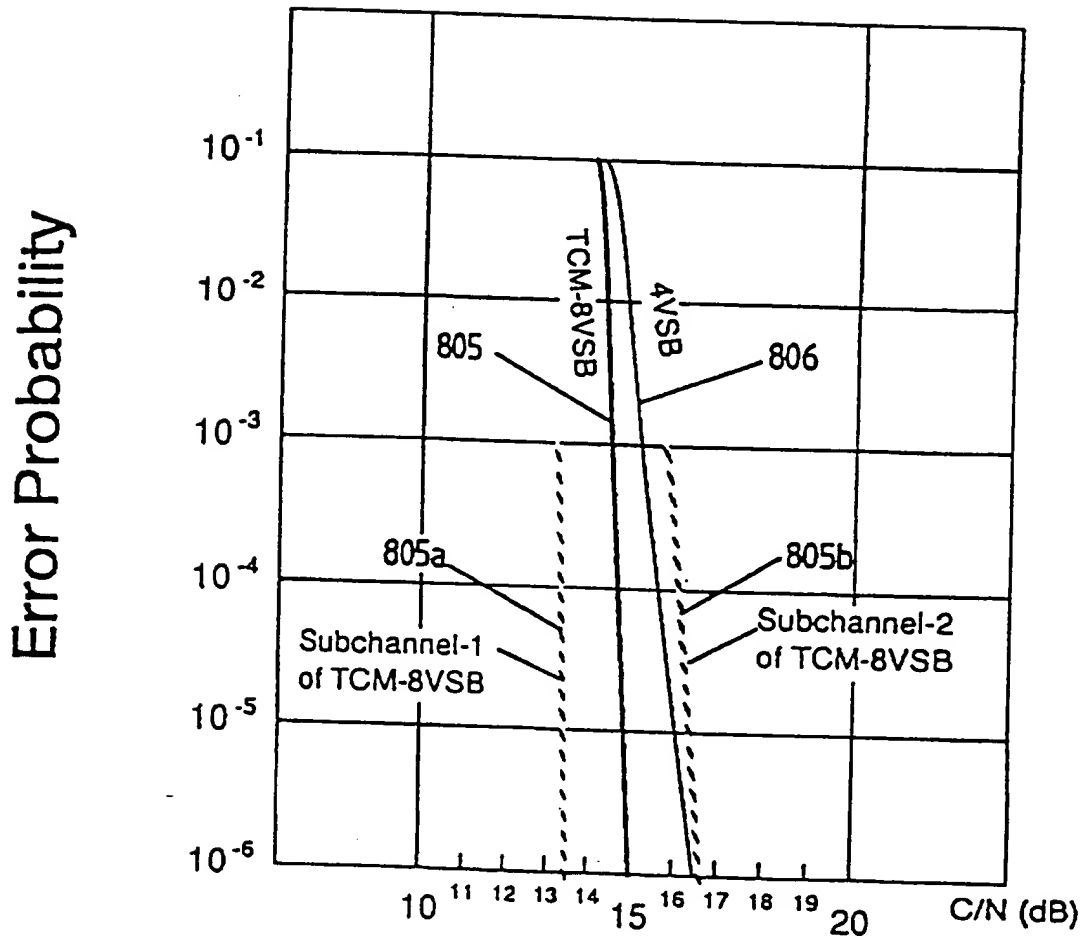

Error Probability
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
10^{-6}
TCM-8VSB
4VSB
805
806
805a
805b
Subchannel-1 of TCM-8VSB
Subchannel-2 of TCM-8VSB
10 11 12 13 14 15 16 17 18 19 20
C/N (dB)

FIG. 165(a)

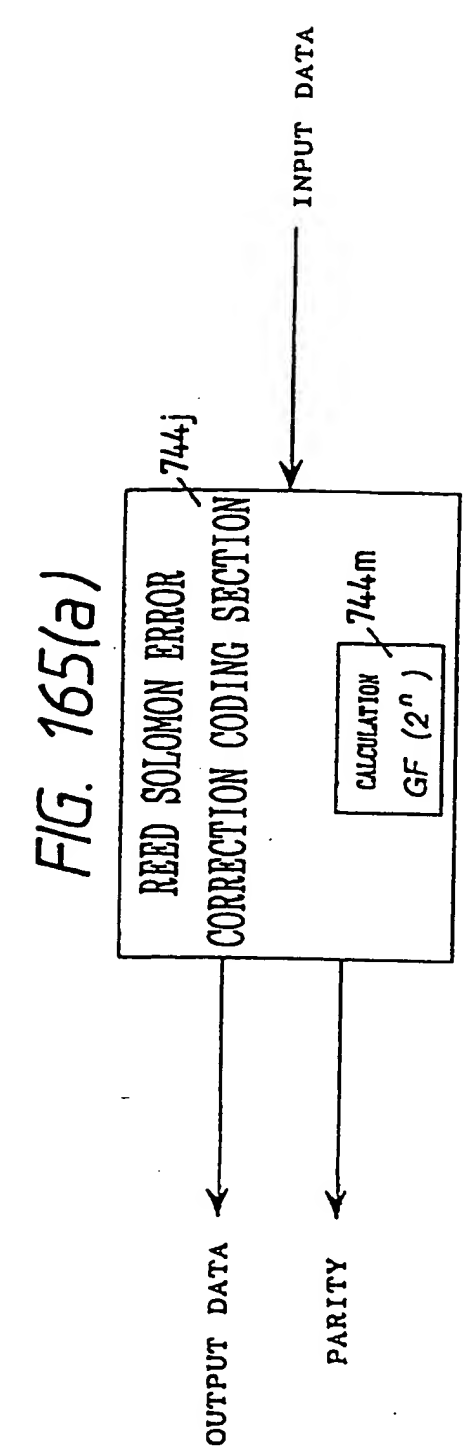


FIG. 165(b)

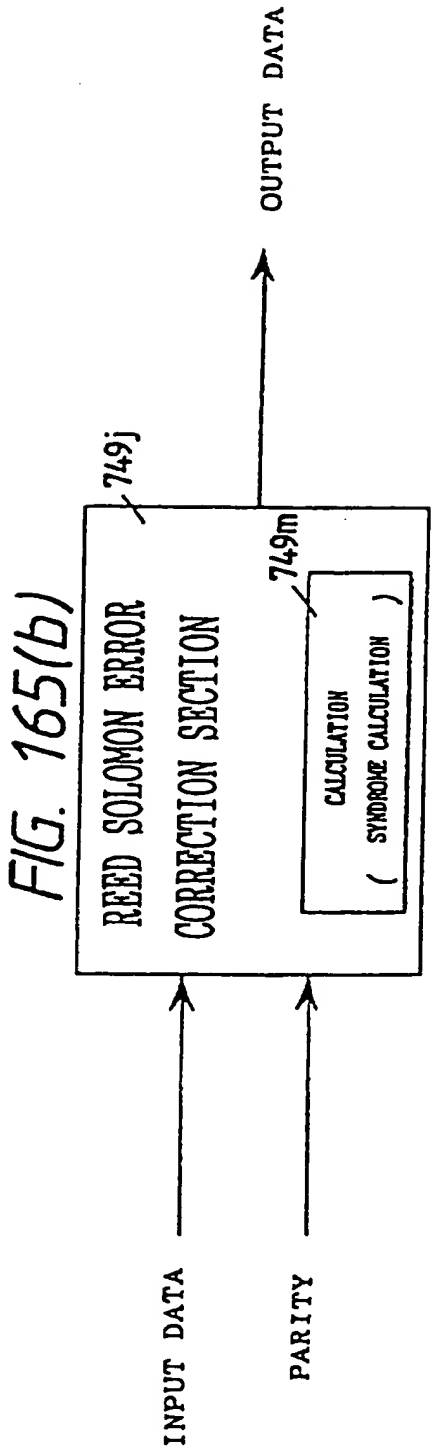


FIG. 166

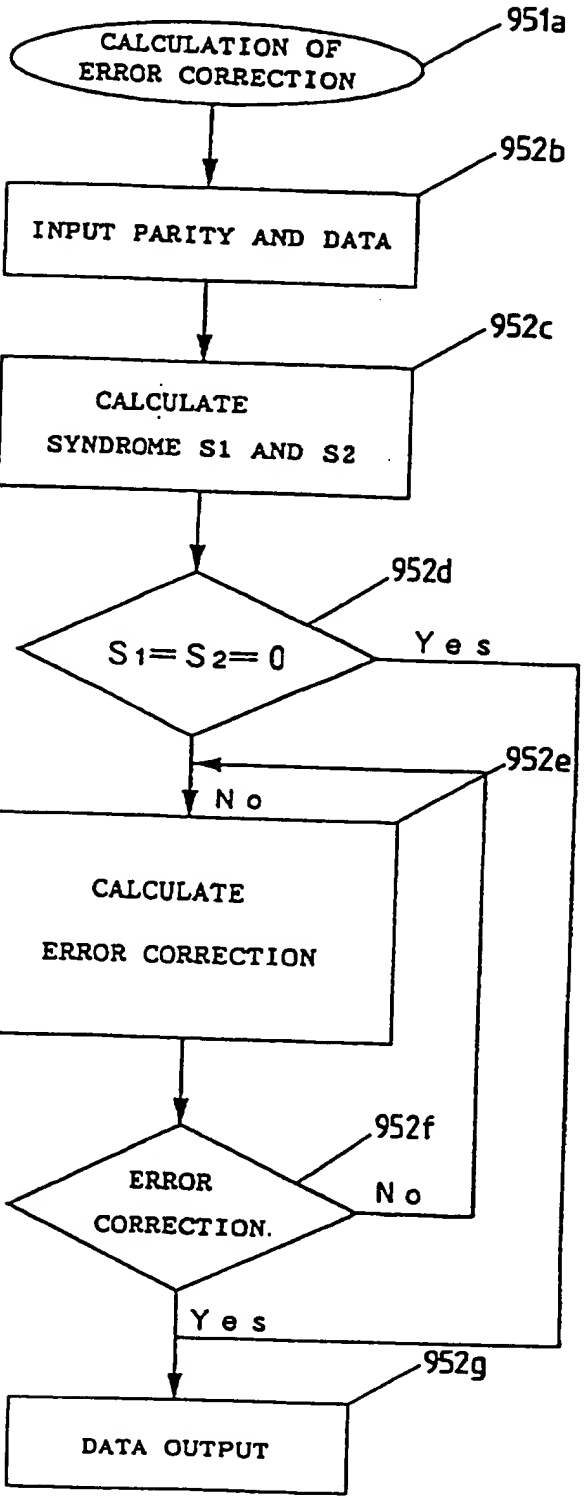
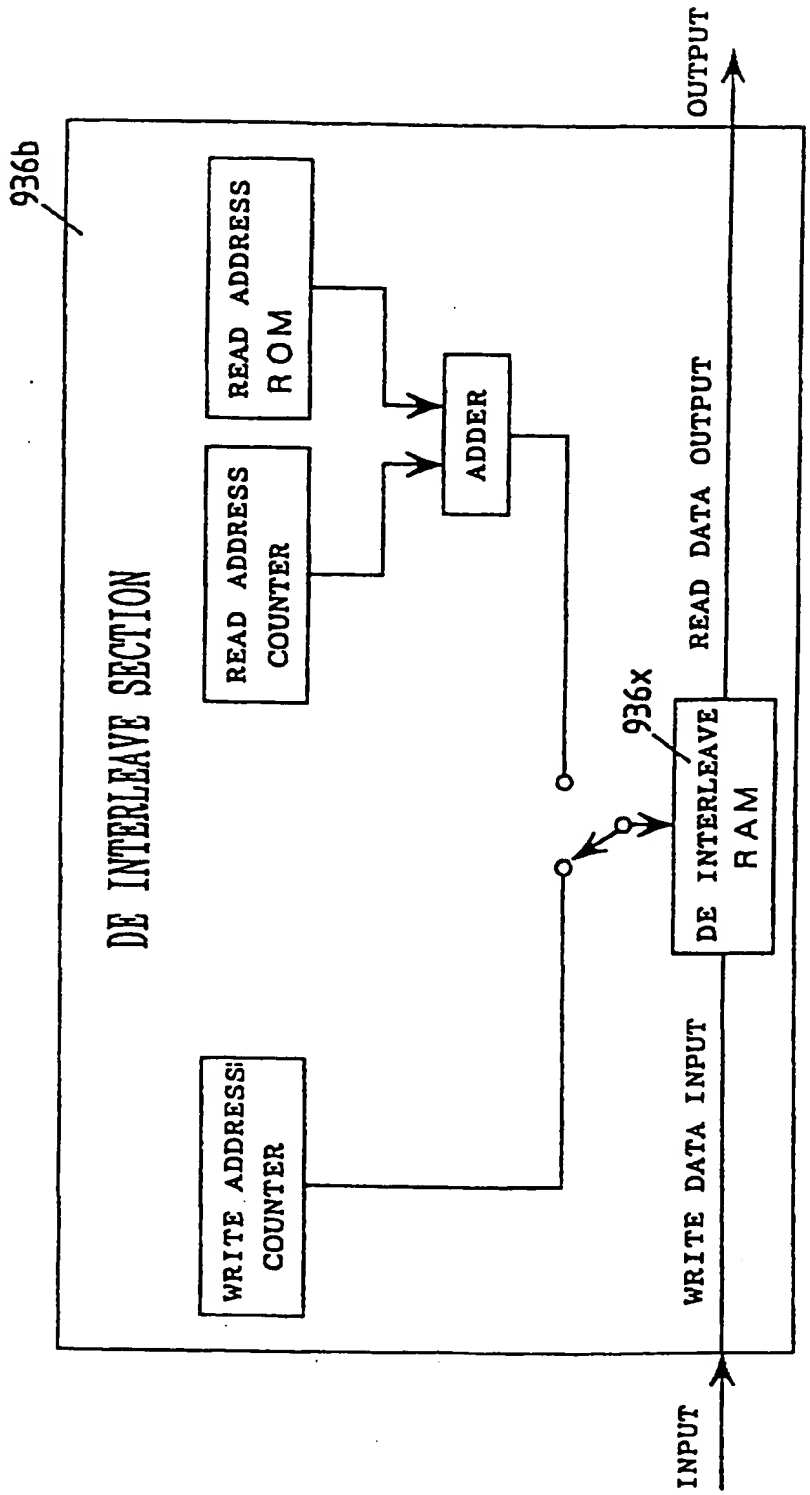

CALCULATION OF ERROR CORRECTION
951a
INPUT PARITY AND DATA
952b
CALCULATE SYNDROME S1 AND S2
952c
S1=S2=0
952d
Yes
No
952e
CALCULATE ERROR CORRECTION
ERROR CORRECTION.
952f
No
Yes
DATA OUTPUT
952g

FIG. 167


936b
DE INTERLEAVE SECTION
READ ADDRESS ROM
READ ADDRESS COUNTER
ADDER
WRITE ADDRESS COUNTER
936x
DE INTERLEAVE RAM
READ DATA OUTPUT
WRITE DATA INPUT
OUTPUT
INPUT

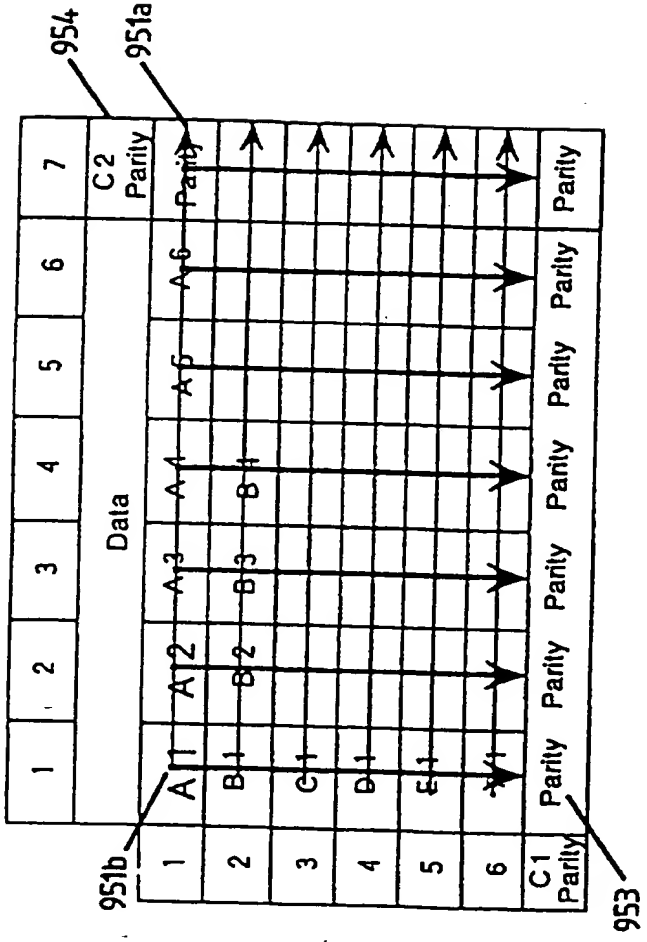


FIG. 168(a) Inter leave Table

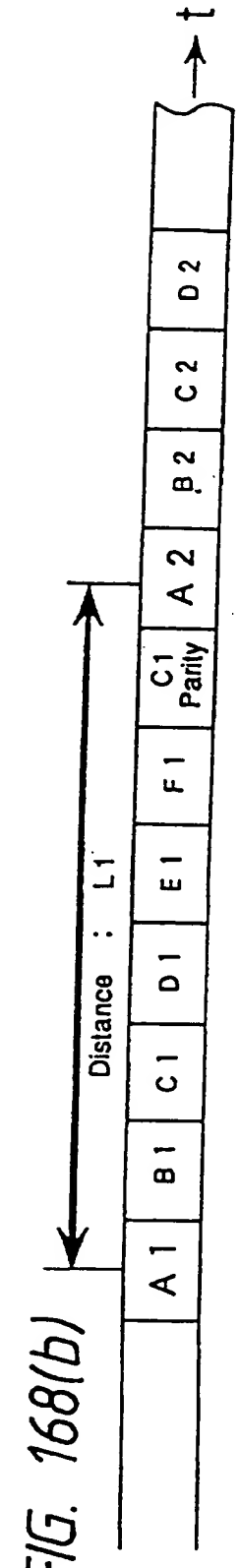


FIG. 168(b)

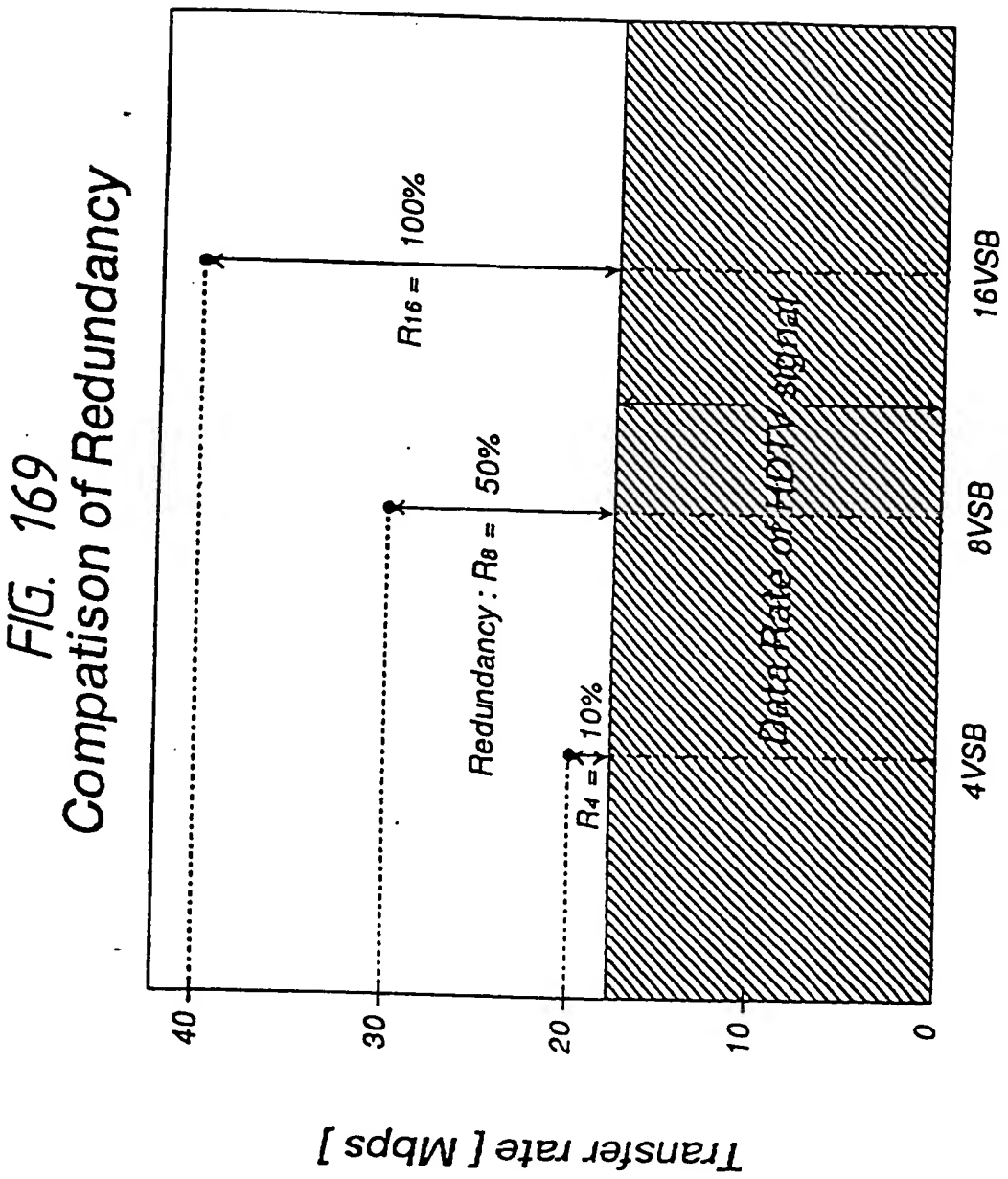


FIG. 169
Compatison of Redundancy

FIG. 170

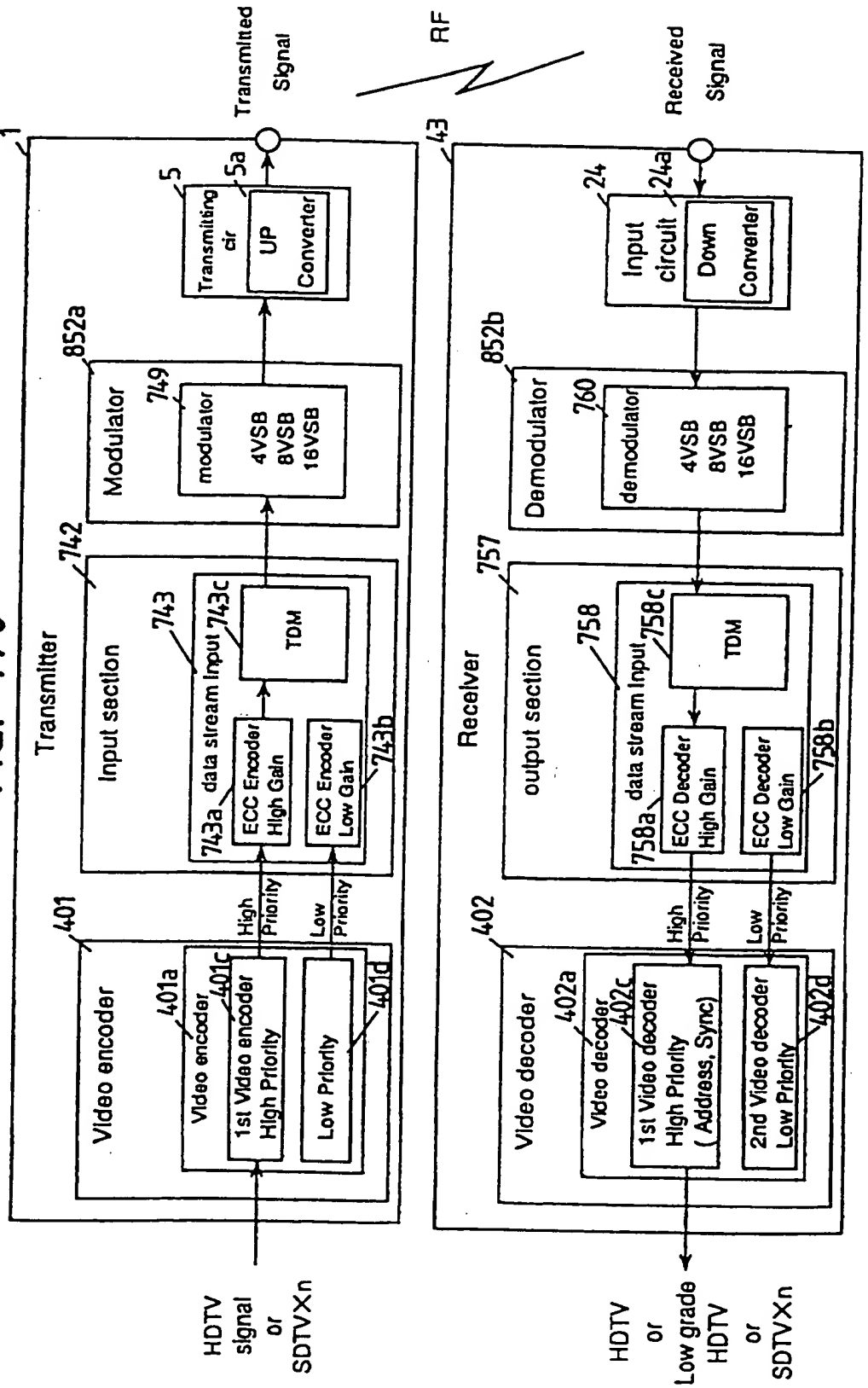

Transmitted Signal
RF
Received Signal
1
Transmitter
Input section
Video encoder
Video encoder
1st Video encoder High Priority
Low Priority
data stream input
ECC Encoder High Gain
ECC Encoder Low Gain
TDM
Modulator
modulator
4VSB 8VSB 16VSB
Transmitting cir
UP Converter
High Priority
Low Priority
HDTV signal or SDTVXn
43
Receiver
output section
Video decoder
Video decoder
1st Video decoder High Priority (Address, Sync)
2nd Video decoder Low Priority
data stream input
ECC Decoder High Gain
ECC Decoder Low Gain
TDM
Demodulator
demodulator
4VSB 8VSB 16VSB
Input circuit
Down Converter
HDTV or Low grade HDTV or SDTVXn

FIG. 171

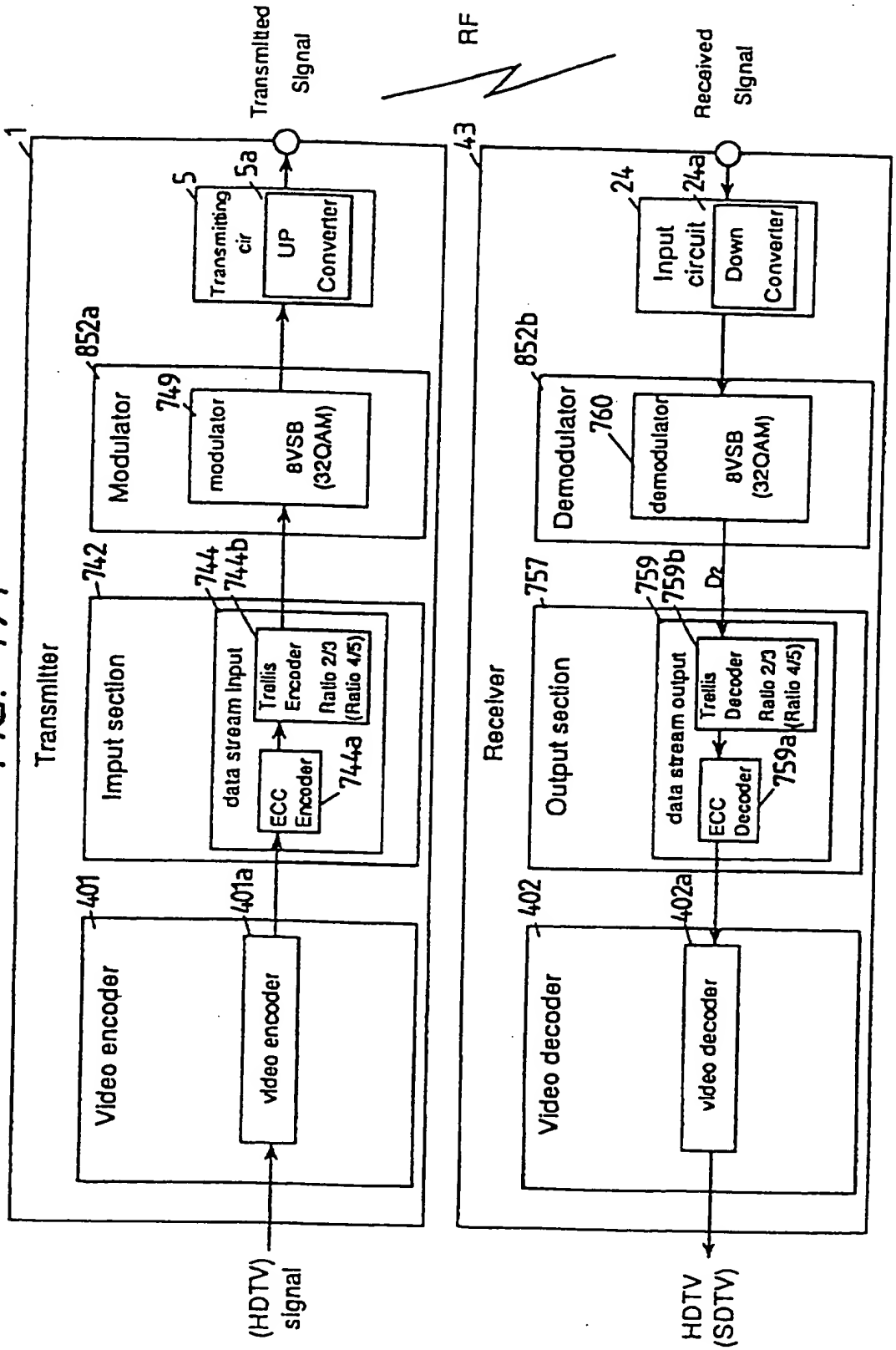

Transmitted Signal
RF
Received Signal
1
Transmitter
Video encoder
401
401a
video encoder
(HDTV) signal
Input section
742
744
744b
data stream input
Trellis Encoder
Ratio 2/3 (Ratio 4/5)
ECC Encoder
744a
Modulator
852a
749
modulator
8VSB (32QAM)
Transmitting cir
5
5a
UP Converter
43
Receiver
Video decoder
402
402a
video decoder
HDTV (SDTV)
Output section
757
759
759b
Dz
data stream output
Trellis Decoder
Ratio 2/3 (Ratio 4/5)
ECC Decoder
759a
Demodulator
852b
760
demodulator
8VSB (32QAM)
Input circuit
24
24a
Down Converter

FIG. 172

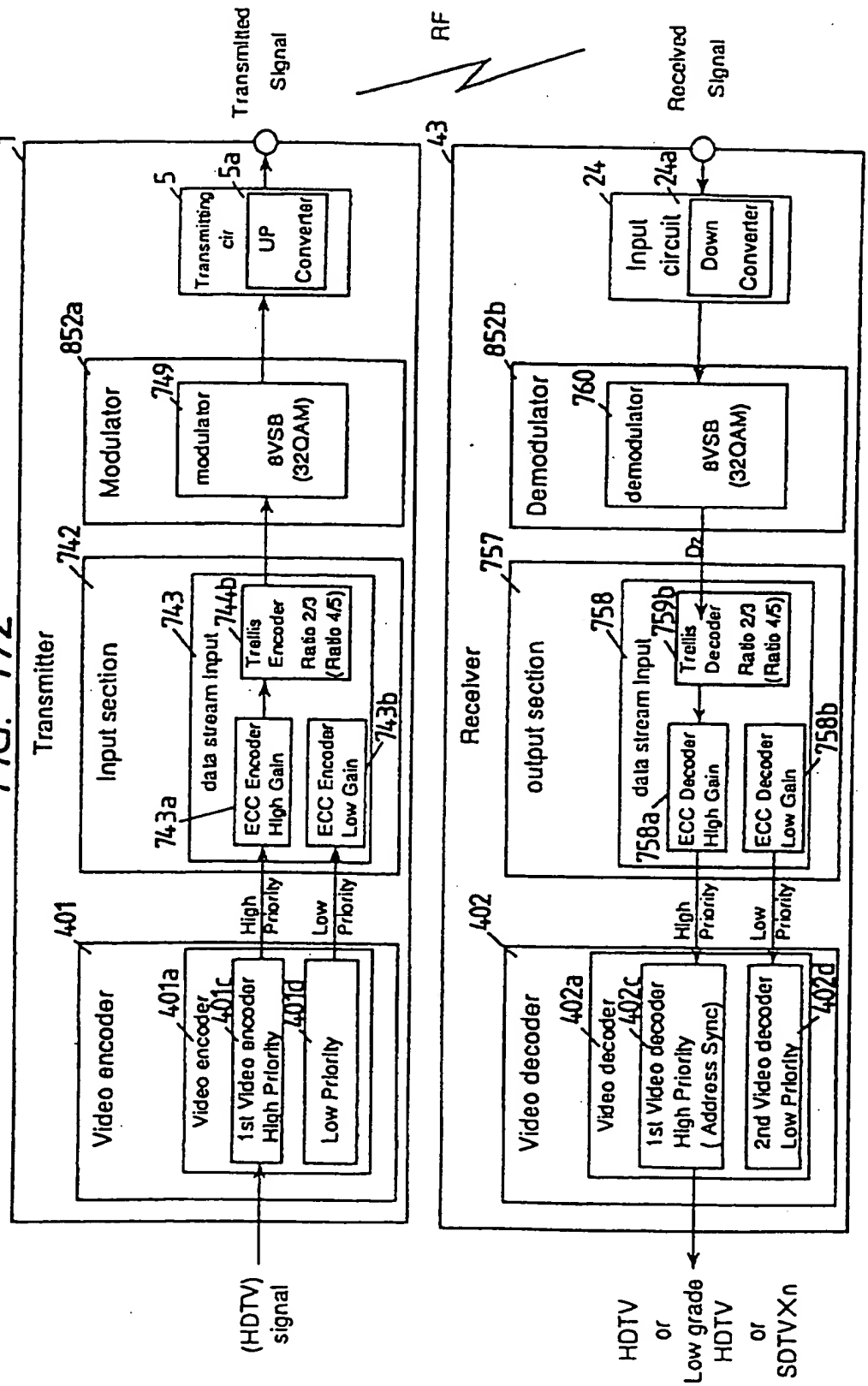
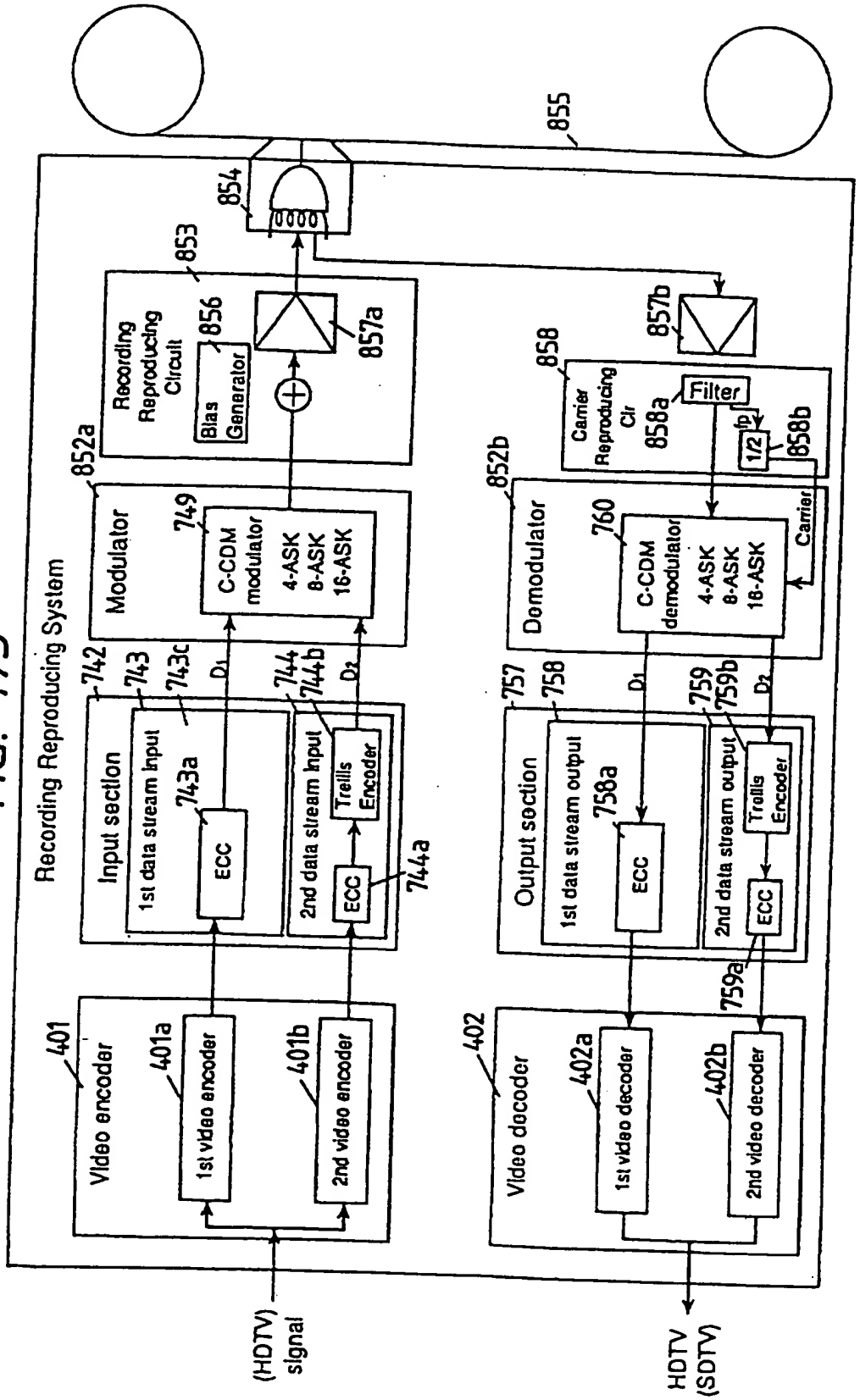

Transmitted Signal
RF
Received Signal
Transmitter
Receiver
Transmitting cir
UP Converter
Modulator
modulator
8VSB (32QAM)
Input section
data stream input
ECC Encoder High Gain
ECC Encoder Low Gain
Trellis Encoder Ratio 2/3 (Ratio 4/5)
Video encoder
Video encoder
1st Video encoder High Priority
Low Priority
High Priority
Low Priority
(HDTV) signal
Input circuit
Down Converter
Demodulator
demodulator
8VSB (32QAM)
output section
data stream input
ECC Decoder High Gain
ECC Decoder Low Gain
Trellis Decoder Ratio 2/3 (Ratio 4/5)
Video decoder
Video decoder
1st Video decoder High Priority (Address Sync)
2nd Video decoder Low Priority
HDTV or Low grade HDTV or SDTVXn

FIG. 173


Recording Reproducing System
855
854
853
Recording Reproducing Circuit
Bias Generator
856
857a
857b
852a
Modulator
749
C-CDM modulator
4-ASK
8-ASK
16-ASK
852b
Domodulator
760
C-CDM demodulator
4-ASK
8-ASK
16-ASK
Carrier
858
Carrier Reproducing Clr
858a
Filter
1/2
858b
742
Input section
743
1st data stream input
743a
ECC
743c
D1
744
2nd data stream input
744b
Trellis Encoder
ECC
744a
D2
757
Output section
758
1st data stream output
758a
ECC
759
2nd data stream output
759b
Trellis Encoder
ECC
759a
401
Video encoder
401a
1st video encoder
401b
2nd video encoder
402
Video decoder
402a
1st video decoder
402b
2nd video decoder
(HDTV) signal
HDTV (SDTV)